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OBSERVATIONS

ON THE

EPIDEMIC YELLOW FEVER

OF NATCHEZ, 342

AND OF THE SOUTH-WEST.

BY

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JOHN W. MONETTE, M. D. &c.

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LOUISVILLE, KY.

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IN presenting to the medical profession, and to the public generally, the result of my observations and reflections, for nearly twenty years, on the subject of Yellow Fever as it occurs in the south-western portion of the United States, I deem it necessary and proper to premise as follows, viz: that the writer is a graduate of the Medical School of Transylvania in its most flourishing era; when the leading chairs were filled by those eminent men, Professors Dudley, Drake, and Caldwell. As a matter in course, the doctrines taught by them relative to Yellow Fever, were the rule of my faith; and such as are still entertained by most of the profession, in the middle and south-western portions of the United States. With implicit confidence in their information, judgment, and experience, I adhered to what I believed the true doctrine of Yellow Fever; a doctrine too, which none dare doubt, or attempt to controvert, without risk to his reputation as a man of science and deep medical learning.

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*ious Fever*; that it is produced locally by local causes, such as a peculiar miasm, or exhalation from certain putrescent matters; and especially from such as constitute ordinary city filth, in alleys, sewers, cellars, and more especially about wharves in commercial cities: that this fever thus generated is confined to the city or district where it originates: that it possesses no communicable properties: or that no exhalation or effusion is disengaged from the body laboring under its influence, which in any manner tends to reproduce that disease in others who are exposed to its influence: that there is no danger of this disease being transported from an infected district or city to one which is healthy; consequently that all quarantine restrictions upon the intercourse and commerce with infected cities and districts, are not only useless, oppressive, inefficient in excluding the disease, but are not sustained by the experience of the enlightened portion of the profession, as consistent with the present state of medical science, in the United States and Europe.

Such were the opinions of the writer; in the comfortable enjoyment of which, no doubt, he would have remained to this day, had not his lot been cast in a region, where it has been his business, from his earliest professional avocations, to see, examine, and treat this disease, under circumstances which compelled him to trace the origin, and causes, and all the circumstances under which it has visited some of the most healthy portions of the United States. Facts have been repeatedly presented which produce the irresistible conviction, that this disease, in the South, may be transported from one place to another, and there disseminated among a healthy population, so as to produce an epidemic. The circumstances requisite for the certain and speedy dissemination of this disease, are certainly more frequently combined in this latitude than in our northern and middle States. Facts, as observed at Natchez and other southern towns, are such as to confirm, in many instances, the doctrine taught and believed in southern Europe, as well as in some cities of the United States, and

especially in those liable to frequent visitations of Yellow Fever.

The first epidemic Yellow Fever which came under our notice, was in 1823. Since that time, circumstances presented by every visitation, have gradually confirmed us in the convictions partially made at that time. Additional facts, and additional reasons have more fully convinced me, that the disease is generally, if not always, imported into Natchez as well as New Orleans, chiefly from Havana and the West Indies. In this belief, for twelve or fifteen years, the writer was almost the only one of the profession in the southwest, who had the courage to declare his sentiments publicly in favor of *importation*. Many who were present at every epidemic, like the great mass of mankind, looked upon the operations of nature, without inquiry, without observation, and without any close analysis of judgment; satisfied to follow blindly in the road laid down by visionary theorists; and which had been generally adopted as *orthodox* and *fashionable*. Ever since the epidemic of 1823, the writer has continued to urge these opinions upon the citizens of Natchez, as well as those of New Orleans; although opposed by the opinions of many excellent physicians, and by the ridicule of those who had nothing better to offer.

Now I have the satisfaction to find that my opinions on this subject are fully sustained; not only by the great body of observing and intelligent citizens, but also by some of the most eminent physicians of this state. Among these are my friends, Dr. McPheeters, and Dr. Davis, the present health-officer of Natchez. The same opinions are likewise obtaining rapidly in New Orleans, Mobile, and Charleston, S. C. The day is not very remote, when New Orleans and other southern ports may be rendered as exempt from Yellow Fever, as Philadelphia and New York now are. A judicious, timely, and strict quarantine regulation, at each of our southern commercial cities and towns, by excluding this pestilence, will be the wise means of preserving annually hundreds and thousands of lives;

and of extending the commerce and prosperity of the people. To the writer, this result would far outweigh all the approbation attainable, by adhering to established opinions, and fashionable errors. We of course expect to encounter the dissent and disapprobation of many distinguished medical men, who have, however, never enjoyed proper opportunities to acquire correct views of this disease in this latitude. I am sustained by many able and learned physicians of the south, when I declare, that our brethren in the great Ohio Valley are greatly mistaken, when they suppose they have seen *true Yellow Fever* north of the mouth of Ohio, unless when rapidly transported in steamboats. But to our subject.

Notwithstanding the great diversity of opinions entertained by medical men, relative to the origin and nature of Yellow Fever miasm, there are a few important facts generally admitted; and from these important deductions are drawn.

It is admitted on all sides that Yellow Fever is the product or effect of a certain deleterious miasm, or poisonous effluvia, operating upon a healthy system unacclimated to its action; that this miasm, malaria, or infection, wherever existing and diffused in the local atmosphere, operates its deleterious influences upon the system, through the medium of the lungs, or by being respired. It is admitted that when this malaria, infection, or miasm, is produced, or exists in any part of a city, in a steady high temperature of autumn, and among a crowded population, it will gradually diffuse itself into the surrounding air, which was previously healthy, and there produce Yellow Fever equally malignant, with that produced by it in the place of its origin. It is also admitted and well known, that when it diffuses itself through any part of a city, that the whole atmosphere to that extent becomes equally deleterious; and that this deleterious property diffuses itself into houses, rooms, cellars, and avenues, and indeed into every recess, or interstice into which common air can penetrate: that it insinuates itself into the texture of porous articles, in which air largely enters: that ships in port, where Yellow Fever is ep-



idemic, become thoroughly infected, and resist every disinfecting agent except a low temperature, which entirely neutralizes it: that persons from northern climates are peculiarly obnoxious to the influence of this miasm: and that strangers or unacclimated persons passing into an infected district, house, or ship, and there breathing that atmosphere for one or two minutes, or even less, will contract genuine Yellow Fever, and probably die with black vomit. It is also admitted and known, that any infected air, either in open space, in houses, ships, or any other place, becomes entirely deprived of its deleterious and morbid properties, so soon as the temperature is reduced to  $32^{\circ}$  of Fahrenheit: it is also well known that when a city or any portion is strongly infected, a storm of wind and rain may pass over the city, and even frost may neutralize or destroy all the external infection, while that in closed houses, ship-holds, and other close places, is unchanged until the temperature is reduced to about  $32^{\circ}$  of Fahrenheit. It must be admitted, that the *removal* of a house or a ship, or any other matter enclosing infected air, does not destroy the infectious virulence, while a uniform temperature is preserved. If this be admitted, it follows of course, that a ship, infected in one port, may sail to another port, and there produce Yellow Fever in those who breathe its contaminated atmosphere. The infected atmosphere of one ship, and especially where several infected ships are contiguous, will and does diffuse itself through the surrounding atmosphere; thus extending the sphere of its morbid influence, in the same manner, as it is admitted that an infected district in a city will finally infect the whole city, where communication is uninterrupted. Besides this process of extension, or of assimilating the surrounding air to its own infectious nature, hundreds of persons, from remote and opposite parts of a city, within a week or ten days, during the time an infected vessel lies in a healthy port, will have direct intercourse with the ship, and thus contract the disease, in the same manner in which persons from the country would do, by visiting an in-

fectured city or town. These persons subsequently are attacked with the disease fully developed, in opposite and remote parts of a city or town, where their dwellings happen to stand. In this manner, Yellow Fever, introduced by vessels or steamboats from the wharves, will show itself simultaneously about the wharves and in various remote quarters of the city. Thus those who look for a palpable and visible extension of the disease, like the spread of fire in a city, are at a loss to trace all the cases to one common source.

Again; we know that this *infected air*, confined in a house during the hot sultry weather of August and September, in the latitude of Natchez, will become more virulent than when first confined in that house. This has been fully exemplified during every visitation of Yellow Fever in Natchez. Houses, which were deserted and closed at the beginning of the epidemic, and when the general air was but slightly infected, and when all the inmates of that house were healthy, and continued so in their retreat, have become so strongly infected by being closed, that on being opened, after frost, and after all general appearance of the disease had subsided, they have been fatal to those who have entered, until thoroughly purified by ventilation and frost.

Again; it is well known that during an epidemic visitation at Natchez, equinoctial storms and rains have so swept out the free infection from the streets and open grounds, that the disease for a time appeared to have subsided: but the virulent infection contained in the houses, and which was beyond the influence of the storm and rain, required only a few warm calm days to disseminate itself as widely as ever.

Yellow Fever is indigenous to the tropics, and will not manifest itself epidemically much, if any, beyond the tropics, unless the infection is introduced from tropical ports in the West Indies. In these islands and other tropical ports of the Gulf of Mexico, Yellow Fever is indigenous, and exists among northern strangers, more or less during the whole year. In these ports it is confined exclusively to the stran-

gers and unacclimated, while those who have been acclimated, or who are natives, are exempt from its influence. Yet as each additional case adds to the virulence of the general infection of a port, a large number of foreigners in port at such time, causing the disease to spread and rage with extraordinary violence, have repeatedly caused the infection to become so unusually virulent, that many of those who were supposed acclimated, have contracted the disease, and even have died.

As a general rule, the natives of tropical cities seldom experience an attack of the disease; and even where it becomes epidemic among them, as it has been occasionally, it assumes such a mitigated form as to present entirely a different aspect from the same disease in strangers.

Hence the inference is sanctioned by every principle of induction, that Yellow Fever as it presents itself among northern strangers in the West Indies, is an *artificial* disease in those ports, a disease which would be altogether unknown among the natives of the West Indies, were it not for the constant influx of northern strangers into their commercial ports. Even in New Orleans this disease would be almost unknown as an epidemic, were the city protected from the hundreds of strangers and European emigrants, who crowd the wharves and vessels from June to October. The disease could not spread without them; it would be like fire without fuel; it would die by its own action. The infection annually introduced into that city from Havana, and other tropical ports, would be comparatively harmless, were it not for the strangers and unacclimated, who serve as fuel, not only to give action and energy to the fire, but likewise to extend its ravages over the city among those who are imperfectly acclimated. The name of "*Stranger's Fever*," by which it is designated in many tropical ports, indicates its true origin and prevalence.

It is a well established fact, that unacclimated persons, from northern latitudes, who visit an infected port, or city,



or who pass through an infected district, or breathe for only a few moments the infected air, will thereby contract Yellow Fever, which will develope itself in five or six days; as a general rule; and often in a less time. The infection is received through the *lungs, by respiration*; and its morbid impression is communicated to the system in the first five minutes of time—and often by the first few respirations. The person who is thus exposed, may travel by steamboat or other conveyance, to remote points, even two or three hundred miles from the point of infection, and there be seized with the disease in its most aggravated form. The distance to which he may travel while the infection is dormant in his system, does not in any wise modify or mitigate the violence of the attack. Thus within a few days, it is possible for twenty or even fifty persons, who have contracted Yellow Fever infection in New Orleans, to be attacked with that disease fatally in Natchez, where all are healthy. This is more likely to occur, as the direct daily intercourse by steamboats between these two points is uninterrupted and extensive. Goods and freight of every kind, and passengers, are continually arriving in great numbers every day; and when the first alarm or declaration, of Yellow Fever as an epidemic in New Orleans, is made public, many strangers and new-comers immediately leave for Natchez and other interior towns. Thus a large supply of infected persons and goods are landed at Natchez within the first three weeks after the disease is epidemic in New Orleans; and a gradual supply is kept up for weeks afterwards. Hence Natchez becomes infected with Yellow Fever within three or four weeks after it has become epidemic in New Orleans. This point and others analogous we shall endeavor to establish as we progress.

The history of every Yellow Fever epidemic in Natchez proves beyond doubt, that those who remain in the city during the gradual increase of the pestilential miasm, acquire a partial immunity to its action, by what is termed acclimation: but when this infectious miasm becomes more virulent from

concentration, these partially acclimated persons are generally liable to its attack in its most aggravated form. Natives of New Orleans, and those thoroughly acclimated in cities subject to frequent visitations of Yellow Fever, acquire an entire immunity against its influence. With such there is no apprehension of danger from the disease; and the period of Yellow Fever epidemic is to them the most healthy of the whole summer; for they are at that time liable to no other diseases. This remark we have heard repeatedly from the acclimated citizens of New Orleans, declaring that the period of the epidemic is the most healthy of the whole year, for those who are thoroughly acclimated.

We have said that infected air, such as exists in every part, avenue, recess, and interstice of an infected part of a city, becomes more virulent in proportion to its confined condition, in a temperature but little under that of a tropical summer, or between  $85^{\circ}$  and  $90^{\circ}$  of Fahrenheit. If the temperature of the confined air be near or above  $80^{\circ}$  it will rapidly increase in virulence; and more slowly in proportion as it is below  $80^{\circ}$ . Confined rooms, ship-holds, and bales and boxes of porous goods, retain the infected atmosphere very near at the usual noon-day temperature; consequently it becomes more virulent than the free portion which is by night reduced 25 or  $30^{\circ}$  below the noon-day temperature. All porous articles as bales of blankets, and feather beds, contain by far the largest portion of their bulk of air. This air is such as that from which they are removed. A bale of blankets compressed until the whole air is expressed will be reduced to less than one third of its original bulk. A feather-bed of ordinary size contains probably 25 lbs. of feathers, in a bed-tick having a capacity for 24 cubic feet of air. The air constitutes the great bulk of the feather-bed; for if the bed be compressed until the whole air is expelled, the bed will be reduced to a solid form, and to a bulk *not exceeding* two cubic feet at most. Thus we should in an infected feather-bed have about 22 cubic feet of infected air. This can be transported undiluted for any reasonable distance,

even 500 miles. The infection carried by such articles in confined vessels becomes more virulent while the temperature is near or above  $80^{\circ}$ , and constitutes what is known as *fomites*, or the *most virulent infection*. The *fomites* in such articles becomes much more virulent upon the human system, when, in addition to the free atmospheric infection, from which they have been taken, they have been saturated with the exhalations and secretions, from bodies laboring under Yellow Fever in its most aggravated form. Such *fomites* are active in producing Yellow Fever in those who handle and sleep on those articles. Hence a smaller portion of this grade of infection inhaled, will excite Yellow Fever, than of the free infection. The secretions and exhalations of a body laboring under malignant Yellow Fever, even in a pure air, will so saturate and infect the bed and bedding of the patient, as to be capable of exciting the same disease, and of the same grade, in those who shall weeks afterwards sleep on, or handle them; provided they have been subsequently shut up in a room or confined in a chest. This fact has been repeatedly established in the different visitations of New Orleans and Natchez. Hence it is unsafe for beds, and bedding, to be carried from an infected city into the country and there used: but it is extremely unsafe to carry and use such beds and bedding as were used by patients diseased with Yellow Fever. Cases of this kind will be stated as we progress.

The transportation of a bed or bedding in the confined hold of a ship or steamboat, does not change the nature or virulence of the infected air contained, but it actually becomes more virulent by remaining confined in a close room, under a high temperature. Hence after a trip of three or four days sail under a tropical sun, where the lowest temperature within the vessel is between  $88^{\circ}$  and  $90^{\circ}$ , the infected air becomes more virulent than when the vessel was in port, and the danger springing from such source is in the same proportion greater.

An individual, sleeping upon a feather bed, or on other

spongy bodies, whether charged with healthy or infected air, necessarily breathes more or less of the air contained. His body presses out of a feather bed, a portion of air equal to the bulk of the body. This air expressed settles around him and is immediately respired; other portions of it are diffused in the contiguous air of the room. Additional portions are successively pressed out by each movement or change of position, and are likewise respired and diffused in the immediate atmosphere. Thus in one night, a healthy individual will press out the greater part of the air contained in the bed on which he sleeps. If that air be infected, he will unconsciously have been breathing more or less of the strongest infection during the night. Should this individual be travelling, he may be attacked with malignant fever several days afterwards, and possibly more than a hundred miles from the place where he received the infection. Such are the circumstances of cases, sometimes adduced by those of contracted observation, to prove that Yellow Fever is sporadic, and of diverse local origins. The disease is seen, and its character is incontestible; but the source from whence it was derived is either forgotten or entirely overlooked.

In this manner, doubtless, are produced many of the cases called sporadic, in the vicinity of infected towns, ships, and houses. Tales of this kind can be passed off currently upon northern men, where genuine Yellow Fever is *scarcely known*: they can also be imposed upon enlightened medical men who have never seen this disease, and who are tied down to received opinions, and pre-conceived theories. To those who live in or near the tropical regions, where Yellow Fever is no stranger, and where all its habits, customs, and characteristics are familiar, these theories pass as an idle dream.

Thus far it matters not from what source, or in what manner, the poison of the Yellow Fever is produced; nor in what manner its effects are produced on the system. We will call it *infection*; and we will admit, for sake of argument, that it is produced from any source which may suit the fancy of the reader. All admit that the local atmosphere of certain pla-



ces becomes infected with this morbidic poison, and that Yellow Fever is the result; that the local atmosphere may be partially, or more strongly charged with this infection, producing the proper Yellow Fever malaria.

As to the nature, composition, and properties of this malaria or poison of Yellow Fever, we know nothing, except from its effects upon the human system. Of its qualities and *modus operandi* upon the human system, we know only by induction: from facts and repeated observation where it prevails, we deduce some of the general laws of its operation.

Its effects upon the healthy system in the production of its peculiar disease, according to Baron Larrey,\* is through the medium of the lungs. This view of its operation upon the system is sustained by many distinguished men, who have been familiar with the Yellow Fever in all its grades, in the West Indies as well as in the United States. My friend, Dr. Cartwright of Natchez, very correctly locates its primary action upon the pulmonary tissues, being inhaled with the common air in respiration. He conceives that its morbidic influence upon the system is conveyed from the lungs, through the medium of the ganglionic system of nerves; and that the disturbance of all the organs and functions of animal and organic life, consequent, constitutes Yellow Fever.† We consider the point established beyond controversy, that Yellow Fever is communicated chiefly, if not entirely, through the air respired; and not by any contact, or any palpable matter otherwise applied.

One point most unsettled in relation to Yellow Fever is, whether bodies laboring under Yellow Fever are capable of eliminating, or throwing off any exhalation, or effluvium, possessing or deriving peculiar morbidic properties. Yet the general clinical regimen, and precautionary measures inculcated, even by those who deny any contagious properties, tend strongly to convince the unprejudiced observer, that *all par-*

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\*See Quarterly Journal of Foreign Med. for April, 1832.

†See Med. Recorder, vol. 9, p. 37-8-9, &c.

*ties do admit* the principle ; although some deny the fact. The general admission of those who disclaim prejudice on either hand is, that when Yellow Fever makes its appearance as an epidemic, in any port, city, or town, each and every additional case tends still further to contaminate the air; in other words, to increase the infection which is abroad. Those who have been frequently conversant with this disease in the southern ports and towns of the United States, and in the West Indies, untrammelled by prejudice or theory, and governed by their own repeated observation, admit this fact without hesitation or argument. Those who are altogether unacquainted with the visitations of this disease should hardly hazard a contrary opinion on the subject.

If one body, or any number of bodies, laboring under this disease, in the midst of a dense population, can possibly have any agency or influence in rendering more virulent an atmosphere already infected, it must be by imparting to it some morbid property. It certainly can not proceed from *diminishing* the amount of infection already abroad. Each portion of the malaria consumed by each individual in developing a case of the disease, must certainly diminish the general amount. The multiplication of cases should therefore diminish instead of increasing the virulence of the infection, if some morbid influence were not super-added from each new case. Each new case therefore becomes a new source of atmospheric contamination. If any thing be imparted to the local atmosphere from a case of Yellow Fever, it must be thrown off in gaseous and invisible form from the body ; either by respiratory exhalation, or by insensible perspiration from the skin. Observation and experience have fully shown that it is not from any palpable excretion from the alimentary canal, or from any peculiar palpable virus.

The skin and lungs are two of the greatest emunctories of the human system, and carry off in a gaseous form more fluids than all the other excretories together. The skin alone throws off by insensible perspiration, in form of gas or vapor, about five pounds of fluid in twenty-four hours. This in form of va-

pour will occupy a space in the free air equal to the dimensions of a large room, or equal to the entire size of the largest balloon.\*

In the period of twenty-four hours the amount of fluid thrown off from the lungs in a gaseous form, is at least thirty *per cent* greater. Respiration throws off into the air a large amount of contaminating affluvia, and tends to deprive the free air of its healthy properties, even while the body is in a state of perfect health. The quantity of gaseous fluids exhaled from each of these emunctories in disease, such as ardent Yellow Fever cannot be less than in health. Consequently every individual of adult age, laboring under Yellow Fever, throws off into the surrounding atmosphere a volume of vapour equal to at least five thousand cubic feet every twenty-four hours. This is unquestionably morbid to a certain extent, and to that vitiates or contaminates the free air. To what extent then must the atmosphere of a house or vessel be contaminated when there are several cases of malignant Yellow Fever, in a comparatively circumscribed and confined atmosphere? Independently of this contamination, the air is still further vitiated by the change which respiration effects in the properties and constitutional elements of the atmosphere respired.

A portion of the exhalations thrown off by these two great emunctories, in disease, is condensed and absorbed by the bed and bedding used by the patient; the remainder is diffused into the surrounding atmosphere. That portion diffused in the free air becomes dilute, and partially loses its virulence; while that confined in the bed and clothing acquires an increased degree of virulence. If this is not the case why do non-contagionists enjoin strict cleanliness and free ventilation, about Yellow Fever patients?

We are told that those exhalations and secretions are morbid in a general way; but do not produce Yellow Fever especially. Do they fear the production of ordinary disease

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\*See principles of expansion by evolving latent heat, by Prof. Espy on storms.



more than Yellow Fever from these unhealthy effluvia? If they have any tendency to produce disease at all, it is surely none other than Yellow Fever; the identical disease from which it is eliminated.

We are not prepared to prove at what stage or period of Yellow Fever the morbid effluvia are eliminated, which are most active in producing this disease in healthy individuals. Baron Larrey, with much plausibility, supposes that there is a particular period of Yellow Fever, when the infectious effluvia from the body is more virulent, or is thrown off in greater quantities. He supposes that this period of the disease is of but short duration, after which the effluvia from the body are much less virulent. In this particular, if Yellow Fever presents any analogy to other contagious, or exanthematic fevers, the most contagious or infectious stage must be during the first two days; or while the excitement is active and the febrile *erethem* is upon the surface. After the excitement subsides, and the *erethem* retires, the activity of the morbid effluvia begins to decline.\* The palpable excretions, such as the urine, fæces, and black-vomit discharge are entirely harmless as a cause of Yellow Fever in those who handle or taste them; and equally so when taken into the stomach.

But it is contended by some that the exhalations and excretions of persons laboring under any and every disease, in a confined air, are to a certain extent morbid; and that in this respect, Yellow Fever is at most only such in a higher degree. This is a false argument. The sickly effluvia, and the palpable filth which might accumulate in a close chamber, would certainly offend the senses and produce some disturbance of the functions of organic life. But if this disturbance were uniformly and invariably of the same grade and variety of disease as that from which those offensive excretions emanated, it would be called contagion or infection by the most sceptical theorist.

Does any non-contagionist enjoin the free ventilation and strict cleanliness in Yellow Fever rooms and wards, for fear

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\*See Townsend on Yellow Fever, of New York, p. 288.

those offensive effluvia may produce in others, remittent fever, rheumatism, or gout, measles, or anthrax? No: they apprehend an aggravation of the Yellow Fever malaria, which is to reproduce in others the *identical disease* of Yellow Fever, and no other. According to their prejudices, this may not be contagion, but it bears a striking analogy. We doubt not that *all epidemics*, to a certain extent, are contagious, or that an accumulation of cases in any one house or street, tends greatly to increase the virulence of the disease in that quarter, as well as its more rapid extension.

There are two kinds of morbid matter eliminated from bodies diseased, and which tend to reproduce the same disease in others. This matter is called contagion or infection. The one is a palpable matter of secretion; the other is an invisible gaseous exhalation. Some diseases throw off one kind of infection and some the other. Others, such as small pox, plague, and malignant erysipelas, throw off both kinds of infection: others again, as syphilis and the vaccine pock, are communicated only by a palpable virus. Of the gaseous infections, some are so mild as scarcely to be estimated, especially in unconfined air. Others are more active, but still are greatly diluted or neutralized by free pure air; such are yellow fever, cholera, typhus gravior, and some others. Some, such as small-pox, throw off such a virulent and subtle effluvium, as to prove infectious under nearly all circumstances, to the distance of a few feet from the patient, and in almost all degrees of temperature. Some diseases disseminate their infectious effluvia in hot sultry air; others in a cool damp atmosphere; others in an atmosphere charged with human exhalations. Each disease, which is not actively contagious or infectious, under all circumstances of seasons and temperature, becomes so under certain peculiar circumstances. Of this class is Yellow Fever, which gives off an effluvium which *becomes* morbid or infectious under the proper circumstances.

In relation to Yellow Fever, the great error of both parties, is *ultraism*. The advocate for contagion or personal infection seems to believe it impossible to originate or disseminate

the disease in any other manner. His opponent, equally scrupulous of consistency, believes that certain circumstances independent of personal infection, do sometimes originate Yellow Fever; and therefore the disease, when produced, must be entirely free from any contagious or infectious properties. Upon this last assumption, we may ask, whence did the first case of small-pox originate? Nature is not parsimonious in her operations for the production of disease, any more than in the other exhibitions of her power. A disease may certainly originate from some peculiar exciting circumstances, independent of personal contagion; and still, when once produced, it may possess properties more or less infectious. The first case of contagious disease certainly did not originate from personal contagion, but entirely independent of it. The same causes may still produce similar effects.

If a disease possess the properties of reproduction, even once in a hundred cases, and under the most favorable circumstances, it certainly has some claims to be acknowledged an infectious or contagious disease. The contagion or infection is specific, because in all cases it produces the same disease as that from which the infection emanated. A disease which spreads by personal infection alone, makes but slow advances through any community, and generally from one individual to another in regular and slow succession. Infectious diseases, assuming an epidemic character, proceeding from an infected local atmosphere, attack a number of individuals almost simultaneously, or in close and irregular succession. Yellow Fever proceeds in the latter mode; and each case tends to extend the limit of the first or local source of infection, until checked by frost, or by a strict non-intercourse with the healthy population. Small pox does not spread in a city in this rapid and irregular manner.

Dr. Rush is the great father of the doctrine of the local origin of Yellow Fever, from putrescent matters, and from city filth. The doctrine taught by Dr. Rush on this subject, enforced and promulgated as it was by his popularity, talents, and industry, has doubtless been the destruction of thou-

sands. Had it not been for his influence in the medical community of the United States, our northern sea-ports would not have been so long subject to the pestilential visitations of Yellow Fever. New York, Philadelphia, and Boston, and other ports of less note, would have protected their citizens by a judicious quarantine, at least twenty years sooner than they did. The southern ports, still acknowledging a vassalage to his authority, and to his arbitrary dictation, through his disciples, to this day immolate hundreds and thousands of victims annually upon the altar of a blind incredulity. But the dawn of their emancipation begins to shadow forth a more discriminating era. A short time yet, and Yellow Fever shall be excluded from Charleston, New Orleans, and all the southwestern ports of the United States. Then this moloch, set up by Dr. Rush, shall no longer devour its living hecatombs of innocent people for its autumnal repast.

At the time when Dr. Rush sought to establish his theory of a local and domestic origin of Yellow Fever, in contradistinction to that which ascribed it to a foreign source, and to imported infection, people were paralyzed with fear at the horrid ravages made by it in their cities. They believed it communicated *exclusively by personal contagion*; and under this conviction the sick were abandoned to their fate, and deserted by friends, and attendants, to perish alone, in neglected despair. None but the strongest of all human ties, those of parental or conjugal love, were able to keep the friends and attendants where certain death seemed to lay in wait for them. Like men in the plague, the plague-spot was a signal for hopeless despair and solitary death.

Feelings of humanity prompted that good man to combat the belief which seemed to sever all the bonds of friendship, and abandoned the sick to their fate. In his zeal for philanthropy, he plunged into the opposite extreme, and was instrumental in throwing off all means of precaution, and to expose whole cities to be ravaged by the worst of plagues. He exerted every influence and urged every argument to convince the people, that the Yellow Fever, with all its horrors, was



free from any contagious or infectious properties ; that unacclimated persons, with perfect impunity, might occupy the rooms, beds, and clothes of bodies laboring under this fatal disease, while continually exhaling its pestiferous effluvia. He endeavored to show that the exhalations and excretions from Yellow Fever patients were as free from morbid agency, as those from the simplest intermittent.

If he had stopt here his name might still be blessed by many ; but he hesitated not to blind the popular judgment, and induce them to adopt a system of police, calculated in practice, to introduce the pestilence into the ports almost every year. He was indefatigable in his exertions to convince the people that the disease was exclusively of local origin, within their cities, and from causes entirely under their control ; that there was no such thing as an infected ship, coming from an infected port ; that when infection and death began to spread about the wharves, vessels, and those having intercourse with them, all proceeded from some small source of putrescent matter, to some rotten potatoes, coffee, or some other equally inoffensive substance, which may have been thrown or spilt about the wharves. In this he presumed upon their want of discrimination in such subjects, where he knew the people could not judge. Hence setting aside what appeared to them hypothesis and speculation, he pointed them to such matters as would strike the grosser senses of sight and smell ; to city filth in alleys, lanes, and sewers ; to putrid animal and vegetable matters ;\* things too, by the by, which had existed in an equal degree a thousand times before, in the midst of uninterrupted health.

It is now time to arrive nearer the goal of truth ; and to point out where truth and error meet ; to lay aside the trammels of authority, and the prejudices of education, that we may view things clearly, patiently, and with proper discrimination. To this end we desire to contribute our feeble aid, and hope we shall be heard with patience, and with a desire

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\*See Rush's Works, vol. 2; edition of 1815; Yellow Fever of 1793; Medical Inquiries.

more to arrive at *truth*, than to sustain any theory or preconceived doctrine.

Notwithstanding the zeal with which Dr. Rush labored to establish his theory of the domestic origin of Yellow Fever in our commercial cities, he has also left on record proof and admissions of all that we contend for, or wish to establish. Although he contends that it is of local origin, and is not contagious, yet he clearly admits that under *certain circumstances* it does reproduce itself; or will spread in *impure* or *miasmatic* air. This air is rendered impure or miasmatic, by certain states of vegetable and animal putrefaction in certain states of the weather. This fact we also admit; but deny any agency to the animal or vegetable putrescency.

Dr. Rush says, "Yellow Fever is not contagious in its simple state, and spreads exclusively by means of exhalations from putrid matters, which are diffused in the air. That it does not spread in the country, when carried thither, from cities in the United States; that it does not spread in Yellow Fever hospitals, where they are situated beyond the influence of the impure air in which it is generated; \* \* \* that it generally requires the co-operation of an *exciting* cause, with miasmata to produce it."\*

Yet he admits in another place, that Yellow Fever exhalations and secretions, accumulating in close filthy rooms, even in the country, will become infectious. He says, "I have heard of *two or three instances*, in which Yellow Fever was propagated by these means *in the country*, remote from the place where it originated, as well as from every external source of *putrid exhalation*."† If a disease assume a contagious character only *occasionally*, it should be ranked as a contagious disease.

He also admits that Yellow Fever may be contracted by "a person *sleeping in the sheets, or upon a bed impregnated with the sweats and other excretions*, or by being exposed to the smell (breathing,) of foul linen, or *other* clothing of per-

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\*See Medical Repository, vol. 6, p. 156, &c.

†Ibid. p. 157.

sons who had the Yellow Fever.”\* Also, “that it was once once produced in Philadelphia *from the effluvia from* a chest of unwashed clothes, which belonged to one of our citizens who had died with it in Barbadoes; but it extended no further than to the person who opened the chest.”

Now what was this if it were not contagion, or infection, created from a patient laboring under disease? a contagion, too, which could remain enclosed in a trunk, in a healthy ship, and in this manner be transported unimpaired in virulence, for 2000 miles? It was a *specific* contagion, producing the *same disease* in a healthy system, as that from which it was eliminated. Dr. Rush also admits that occurrences of this kind would be more frequent, were it not for “the *superstitious dread of contagion*, which has generally produced *great care*, not only in washing-sheets and clothes, and airing beds supposed to be infected, but frequently the total destruction of them by fire.”† Thus, according to Dr. Rush’s admission, Yellow Fever would be imported much more frequently were it not for that “*superstitious dread*” which prompts to every precaution necessary for its exclusion. Strange that he should have labored to prove that this disease is produced exclusively by putrid effluvia about wharves, &c.

At the same time, the united talent and experience of the whole medical profession of the United States and Europe was in direct contradiction to the doctrine of the local origin of Yellow Fever, from filth and putrid effluvia. The College of Physicians, of Philadelphia, in reply to a call from the Governor of the State of Pennsylvania, after mature deliberation, made the following report in 1793, viz:

“No instance has *ever occurred*, of the disease called *Yellow Fever*, *having been generated* in this city, or in any other parts of the United States, as far as we know; but there have been *frequent instances of its having been imported*, not only into this, but into other parts of North America, and prevailing there for a certain period of time. From the rise, progress, and nature of the malignant fever, which began to prevail here

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\*Med. Repos. vol. 6, p. 156, &c.

†Ibid.



about the beginning of last August, and extended itself gradually over a great part of the city, we are of opinion that *this disease was imported into Philadelphia* by some of the vessels, which arrived in port after the middle of July. In this opinion we are further confirmed by various accounts received from unquestionable authorities."

Signed by order of the College of Physicians.

JOHN REDMAN, *President*.

November 26, 1793.

This opinion of the College of Physicians was sustained by the great body of the medical faculty in the city, as well as in the United States. Dr. Rush and a few others contended that the whole epidemic of 1793 originated in a lot of spoiled coffee!!\* Subsequent epidemics he ascribed to putrid hides and potatoes.

Dr. Litton, an eminent physician and contemporary of Dr. Rush, speaking of the Yellow Fever which prevailed at Wilmington, Delaware, in August, 1798, says: "*No one doubted its having been brought from Philadelphia*, in the infectious bad air in boats and shallops," &c.; also, he says, it began about the water's edge, and spread gradually up to the highest streets; having first appeared in August, it became epidemic by the middle of September.†

Relative to the same epidemic, Dr. Geo. Monroe says, it was clearly traced to an infected vessel from Philadelphia, then at the wharf; and that the portion of the town near the wharf suffered most severely.‡ The temperature of the atmosphere, and the state of the season being suitable for the propagation of the disease, it soon assumed an epidemic character. Dr. Rush himself admits, that when the atmosphere is highly infectious, or "charged with the miasmatic effluvia, or 'pestilential exhalations,' a single case of Yellow Fever will excite it in a whole family."§

\*See Med. Inquiries, Yellow Fever of 1793,

†See Med. Repos. vol. 3, p. 128-30.

‡Ibid. p. 136, &c.

§Med. Repos. vol. 6, p. 160.

These facts are not adduced by these men as evidence of *personal contagion* in Yellow Fever; but as showing clearly that the contaminated, or infected air from the holds of ships, may be so diffused about a wharf as to produce Yellow Fever in those who breathe it, after residing in a miasmatic atmosphere. Although they do not admit that there is any peculiar contagion, or infection, contained in such vessels; yet they believe it is an impure, or infectious air, capable of producing Yellow Fever in those who breathe it, and of diffusing itself with morbid virulence in the surrounding air, when the latter is contaminated with miasmatic exhalations; but that in a pure atmosphere, free from these miasmatic exhalations, it is innocent.\* This admits a great principle, which is equally important, as if it admitted direct infection or contagion. It admits that from whatever cause, a ship may introduce Yellow Fever from one port into another. Yet they contend, that in a healthy pure atmosphere, this infection will not spread so as to bring on an epidemic; that only those who go on board such vessel are liable to contract disease from it; and that those who are thus attacked can communicate no disease to others unless the air is highly contaminated by miasmatic exhalations.

This contaminated state of the air, which is said to be requisite for the dissemination of Yellow Fever, presents precisely the condition we deem requisite for its propagation as an epidemic. But Dr. Rush and others, compelled to admit the truth and force of these facts, endeavor to evade the true inference, by ascribing all the morbid influence and Yellow Fever predisposition, to a previous state of the local atmosphere; leaving to the malaria from the vessels, only the agency of an *exciting cause*. In this view of the case, the seeds of this peculiar disease had been previously imbibed, and continued in a dormant state, until the *exciting* cause of miasm warmed them into life. This would place the infectious air, or malaria of ships, which is known to produce Yellow Fever, in precisely the same relative agency as fatigue, exposure, or

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\*Med. Repository, vol. 3, p. 200.

dissipation, in all its forms. On this principle the disease excited into action, should be as various as are the forms of disease induced by such causes.

The followers of Dr. Rush have greatly extended his discoveries into the mysteries of Yellow Fever miasm. Since his time, it has been discovered that, not only putrescent coffee, Irish potatoes, and city filth, which offend the senses, but that numerous other sources are equally active in producing epidemic Yellow Fever. Although all experience and authority concur in admitting that Yellow Fever infection, when prevalent, is an invisible, inodorous, and aerial poison, which cannot be perceived by any of the senses, nor be detected by any chemical analysis, yet the followers of Dr. Rush look exclusively to the *factor of putrefaction*. When Yellow Fever makes its appearance in a city, or in any port, a search is immediately undertaken for the source of the infectious miasm. The first matters in a state of decomposition, whether animal or vegetable, are at once hailed as the fountain and source of all the pestilential miasm. If neither of these be found in the proper direction, some filth nearly allied to a combination of both are sought and most generally found!!

This continues to be the case, notwithstanding these fœtid effluvia have been tested experimentally, and found to contain no principle actively deleterious to health. Epidemic Yellow Fever is still traced to matters which are offensive to the *olfactories*, notwithstanding all experience proves that the most active infection of Yellow Fever cannot be distinguished by any of the senses from common air. Instead of pursuing the dictates of reason and experience, these inquirers are too frequently "*led by the nose*;" and when nothing else presents of sufficient importance, all the pestilence is traced to a filthy back-yard, a wet sewer, a dead rat, or a rotten Irish potatoe.

Others guided in their observations by a sincere desire to arrive at truth, have been indefatigable in their efforts to discover the true source of this mysterious poison. The medical profession have been unremitting in their exertions to detect

the origin and nature of this poison. But all theories which trace its source in the United States, to animal or vegetable putrefaction, or to both jointly, must be abandoned, as inapplicable to our southern ports at least. In many cases acute inquirers have supposed they had traced the monster to his den; but when they have attempted to place the shackles upon him, he has vanished. Others again, repudiating the putrefactive origin, have sought other sources widely different from either. Knowing it to be an invisible gaseous poison, beyond the test of any of the senses, they have directed their inquiries to atmospheric causes. At one time it has been traced to a long continuance of high temperature at certain seasons of the year. At another time it has been traced to great and sudden vicissitudes of weather; such as heat and cold. At other times, to electricity, or to a mysterious epidemic constitution of the atmosphere, without any other definite idea. All these, at times, may have exerted some influence or agency, in modifying the action of the poisonous miasm; but they certainly could not have been the primary active source of the disease. They may have increased or diminished the susceptibility of the system to its action, or so modified that susceptibility, as to cause the morbid effects upon the system, to appear more or less the immediate consequence, from the efficient malaria, or infection.

In the further consideration of this subject, we shall briefly examine the most prominent theories or hypotheses relative to the prime origin of the Yellow Fever epidemic miasm. We shall next show, from American authorities, that Yellow Fever has been repeatedly introduced by infected vessels into the ports of the United States, and that the most malignant epidemics were the consequence. Our views of the manner of introduction and dissemination in the south-western ports, will be fully exemplified in treating of the epidemics of Natchez, as well as in relation to the prevalence of Yellow Fever in many ports and towns of the south-west in the summer and autumn of 1839.



## GENERATION OF YELLOW FEVER MALARIA.

The advocates for the local origin of Yellow Fever in the United States, are not unanimous as to the exact circumstances under which the malaria, or infectious air of Yellow Fever is generated. The only point on which they appear to agree, as a general principle, is, that it is the result of the solar heat upon some putrescent matter. This may be any variety of animal or vegetable matter, in a state of decomposition; or it may proceed from both those classes of matter combined; or it may be the combined gases from each of these separately, which produces the malaria necessary to induce epidemic Yellow Fever. Rarely do we find any two of the advocates for the local domestic origin, who agree as to the *particular kind* of animal or vegetable matter, which is most productive of the miasm necessary for producing an epidemic. Some ascribe it chiefly to one kind; others to a different kind. Some require the aid of vegetable decomposition, with *marsh-miasm*; others can, satisfactorily to themselves, show that it is the product of *animal* matter chiefly.

The advocates of this doctrine range themselves under one of each of the following sources of Yellow Fever Miasm:

1. Animal putrefaction.
2. Vegetable putrefaction.
3. Marsh-miasmata.
4. Sensible changes in the atmosphere.

Others ascribe the disease, when epidemic, to some peculiar atmospheric constitution, or some mysterious combination in the elements, entirely beyond our comprehension, the *to thion* of *Hippocrates*.

We propose to note each of these briefly, and to pass on to what we consider a more rational and consistent explanation of the origin and production of Yellow Fever malaria. We design to show that none of these local causes are adequate to the production and dissemination of this epidemic malaria; and that we must extend our researches beyond such matters if we wish to arrive at truth, and to protect our ports from this pestilential disease.

1. ANIMAL PUTREFACTION.—Those who look to this source, conceive that this poisonous miasm is thrown off into the atmosphere from either of the following animal matters, viz: From putrid or putrescent fish, putrid bacon or pork, putrid animal carcasses near cities,\* from putrid oysters in cellars, or in piles in the open air, from putrid hides in ships and on the wharves, from the opening of old burying grounds, &c.

That none of these are *essential* sources of Yellow Fever miasm, has been established almost beyond controversy. Dr. Bancroft, in his great work on marsh-miasm and Yellow Fever, has adduced an array of facts and evidence incontrovertible, proving that animal putrefaction may exist to any extent, and under *all circumstances*, without in any wise exciting Yellow Fever; and, consequently, that it is not a *necessary* source of Yellow Fever miasm; and which, of course, must proceed from some *other cause*. He has shown, conclusively, that this species of putrefaction is *not a frequent* concurring circumstance, where Yellow Fever has originated. He has also shown that animal putrefaction, to a great extent, has existed in cities and other localities, under the most favorable circumstances, for the production of this miasm, according to the putrefactive theory, and still no Yellow Fever has been produced either sporadically or epidemically. He has further shown that putrid pork, putrid fish, putrid bacon, &c., will not generate any pestilent miasm. Nor will dead bodies of any kind, in a putrescent state, produce Yellow Fever, or any other malignant disease, not even human bodies putrefying by hundreds on the burning sands of Egypt. Neither is it produced from the intolerable stench exhaled from factories of glue and catgut; nor from tanneries, slaughter-houses, tallow-chandleries, &c. Indeed those engaged in these avocations are generally blest with the most perfect health; and their business appears to confer a partial immunity from ordinary disease.

These facts are incontrovertible. They establish the doctrine sanctioned by experience, that the miasm or morbid malaria, or the infection of epidemic Yellow Fever, whatever

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\*Dr. Cartwright, of Natchez: See Medical Recorder, vol. ix, p. 5 to 10 and p. 228.

be its nature and constituents, is not in any sense connected with, or dependent upon the *fætor* of animal putrefaction in any of its stages of decomposition.

Again it has been placed beyond doubt, by Dr. Bancroft and others, that Yellow Fever infection has been generated, or accumulated abundantly in ships at sea, where no putrid matter, either animal or vegetable have existed as a *possible* source. A case of this kind in point is found in the United States brig "Enterprise," more particularly noted hereafter. On the other hand there are towns and ports, within the tropics, where putrid vegetable and animal matters abound, in combination, with the offensive effluvia from filthy and muddy bottoms of shallow harbors, and yet the people of these places enjoy almost uninterrupted health. The town of Campeachy is an example hereafter cited.

We shall show also in some of the most destructive epidemics of Natchez and other south-western towns, that animal putrefaction had no agency whatever in its production. In fact, that putrefaction, in any form, is not an essential agent in producing epidemic Yellow Fever.

## 2. VEGETABLE PUTREFACTION, OR DECOMPOSITION.

Those who ascribe it to vegetable effluvia, trace it to putrid coffee, putrid potatoes,\* putrid oranges, rotten corn, putrid sour-kraut,† sour porter in warehouses or near the wharves.

That this is not an essential cause of yellow fever miasm, is proven by the same array of facts and arguments presented in the work of Dr. Bancroft, against animal putrefaction.

Vegetable putrefaction, of the most offensive kind and in the most extensive degree, has occurred without producing a single case of yellow fever in those exposed to the effluvia. On the other hand, the most desolating epidemics have prevailed where no mass of vegetable putrefaction could be found.

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\* Dr. Rush: See Medical Inquiries.

† Dr. Cartwright: See Medical Record, Vol. 9, p. 226.



In every county and settlement throughout Mississippi and Louisiana, how often do we find hundreds of bushels of cotton-seed in a rotting state, exhaling its intolerable stench, while no disease of any kind, much less yellow fever, is produced in those daily exposed to its influence? These immense accumulations of decaying cotton seed are found on almost every plantation, exhaling a most offensive fœtor, to which every soul on the plantation is more or less exposed during the burning suns of summer as well as after the rains of spring and autumn. Yet we never have known, or heard of any case of disease, much less yellow fever, traced to such source.

For many weeks before the epidemics of 1837 and 1839, in Natchez, the most zealous advocate of vegetable origin, did not even suspect any matters of that kind; for nothing of the kind existed about the city, as *all admitted*.

On the other hand, after the great tornado of May 7th, 1840, the whole city of Natchez was filled with the ruins of demolished buildings, and every kind of matters covered up in the masses of ruins within the city: the forest growth in and about the city was a scene of destruction; and immediately opposite Natchez, a large grove of cotton-wood and other trees, covering probably near sixty acres, was entirely torn to atoms, covering the whole surface to the depth of many feet, with the mass of timber, trunks, branches and foliage, of a most luxuriant growth. This was in the very midst of the process of vegetable decomposition in July and August following, after the subsidence of the river inundation.

Besides this, at the base of the bluff near the Natchez landing, there was a pond covering about ten acres, with a common depth of 3 or 4 feet water. This pond was filled to the bottom, and for a foot above its surface, with ten thousand fragments of demolished houses, with carcasses of animals, and even men who were supposed to have been buried under them. In this condition it remained, frequented by hundreds of people every day, until October, exposed to all the effluvia which could be exhaled by a powerful sun for nearly

four months. With all these extraordinary circumstances, Natchez enjoyed uninterrupted health through the whole season; contrary to the confident prediction of a most desolating yellow fever epidemic, by the advocates for the origin from such causes. New Orleans was free from yellow fever that autumn.

In ordinary seasons, when vegetable decomposition, as a matter of course, would progress more rapidly, with alternate showers and sunshine, we never have any apprehension of yellow fever in Natchez: but when all moisture is dissipated from the surface of the earth, and when vegetable decomposition necessarily ceases for *want of moisture*, then yellow fever begins to make its appearance, if at all. Yet the yellow fever of Natchez has been ascribed at different times to diverse vegetable matters, because once or twice such matters were found soon after yellow fever made its appearance as an epidemic.

### 3. MARSH MIASMATA.

Those who ascribe yellow fever to marsh-miasmata, have traced it in imagination, to the exhalations from stagnant water in marshes; to the effluvia from marshy grounds, when all moisture is nearly dissipated, and the dried surface begins to crack open; to the exhalations from mud and filth in the shoal harbors, or on the slimy banks, and battures of great rivers; to common city filth in sewers, back yards and alleys; to loose earth recently thrown up from beneath the surface;\* and when these are wanting, to whatever their fancy may suggest. All these we hope to show are *non-essential* in the yellow fever epidemics of Natchez.

Dr. Bancroft, in his great work on yellow fever, has labored hard to prove that *marsh-miasm* is the true and essential cause of yellow fever. On this point his labor has all been in vain. The experience of thirty years since repudiates his doctrine.

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\*Dr. Menvill: North American Journal of Medical Science, vol 1, p. 1 to 20.

We find from medical records too numerous to cite, that this terrible disease in the West Indies, prevails equally in the vicinity of marshes, and on the most baren rocks, where no marsh is near. We find it equally prevailing on high and low situations, upon the Natchez bluff, 300 feet above tide, and on the low alluvions of Charleston and New Orleans, scarcely above high tides; on the sandy beaches of Mobile and Pensacola, and upon the barren rocks of Curacoa in the West Indies, and of Lisbon, Cadiz, and Gibraltar, in Europe. We find it likewise prevalent on the deltas of the Mississippi, Oronoco, and the Amazon.

On the other hand, we find in many of the low marshy regions of Louisiana, in Attakapas, Terre Bonne, La Fourche Interior, and about St. Augustine, in Florida, the most healthy population of all the South, where longevity is proverbial,\* and Yellow Fever is unknown.

In the West Indies it is endemic all the year in the *commercial ports* on the coasts, while it is unknown in the *interior* towns of the islands. It is equally unknown in the Southern towns of the United States, where there is no direct trade with West India, or infested ports.

The most extensive marshes in the Southern portion of the United States, are as free from Yellow Fever as are the pine hills of Mississippi and Alabama. This is confirmed by all experience in the extensive plantations which everywhere spread over the Mississippi bottoms.

#### 4. SENSIBLE CHANGES IN THE ATMOSPHERE.

Those who ascribe epidemic Yellow Fever to this cause, have conceived that the disease was produced by a dry and heated state of the atmosphere; or by moisture in the air at a high temperature. Professor Caldwell contends that the predisposition to Yellow Fever is induced by a continued mean temperature of 80° Fahrenheit, for forty days successively.†

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\*See Dr. Cartwright on *Jussieuia Grandif.*, West. Jour. of Med. and Surgery.

†See Med. and Phys. Memoirs, Lexington, 1826, p. p. 141, 142, &c.

Others believe that sudden vicissitudes, from hot to cold, and the reverse, produce the epidemic constitution of the air. Others ascribe it to the electric condition of the air as indicated by the amount of thunder and lightning which is observed during such periods.

That this disease does not originate essentially from a *humid* or *arid* state of the atmosphere is clearly shown by the whole history of Yellow Fever epidemics. This disease has been epidemic in cities of the United States and Europe as well as in the West Indies. It has made its first appearance in Philadelphia, in the hottest and driest weather; and it has begun to spread in New Orleans, *after* a dry summer, while the earth was washed with showers almost every day. It has likewise made its first appearance in Natchez in the most hot and sultry condition of the air, after the greatest drought throughout the whole State, and it has spread and continued to prevail through all the vicissitudes of weather above a temperature of 40° of Fahrenheit's thermometer. It has also begun to spread in Natchez and in New Orleans under all these vicissitudes of weather. It has prevailed in these two cities after every variety of weather during the spring months; after a wet and dry spring; after a late cold spring, and after an early and warm spring.

It prevails at times in *commercial* ports where the air is either habitually dry or humid; no less on the dry and parched shores of Curacoa, than on the flat alluvial marshes of New Orleans. But in all places where it has ever prevailed as an epidemic, it has been after a long dry oppressive summer; and this is especially true in relation to its epidemic visitations in the United States.

Dr. Peixotto informs us that the Yellow Fever is endemic in the island of Curacoa during the year, at all times and seasons; but that it prevails more especially in the "*calm and sultry months*;" that "*new comers from Northern latitudes are its appropriate subjects; the natives and seasoned inhabitants being exempt from its attacks.*"\* He moreover informs us that

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\*See New York Med. and Phys. Jour., vol. 1, p. p. 411, 412, &c.



"it never assumes an epidemic character unless after the arrival of large numbers of *northern strangers* during the *sultry* months of the year."

On this island, situated under a vertical sun, the climate is hot, but the air of the island is proverbial for its *dry elastic* qualities. He informs us, "the air is *pure* and *dry*, and seldom, or never, darkened with mists and fogs, so frequent at the north;" that "during the droughts which are common, the leafless desolation of winter reigns under a tropical sun; ordinary wells are exhausted; animate and inanimate nature suffers under the burden, and seems nearly ready to waste away and perish."\* On this island there is no marsh and scarcely a living stream of fresh water.

This is one of the islands where Yellow Fever is *indigenous*; it is also *indigenous* to *certain ports* in numerous other islands in the Caribbean sea, and in the Bahama and other groups, together constituting the West Indies, and the Great Antilles. Here is the proper origin of the American Yellow Fever.

The views of Professor Caldwell, before alluded to, as to an unremitted mean temperature at or near 80° of Fahrenheit, approach nearer the true cause, than any thing we have seen. This degree of mean temperature, provided the atmosphere be calm and sultry, is requisite, to a certain extent, to prepare the atmosphere of a port or city for the prolific spread of *yellow fever infection*, when once introduced. But in the United States, this degree of mean temperature has been witnessed, where no yellow fever has been produced or existed in any condition; whereas we know that yellow fever has prevailed as an epidemic, *unprecedented* by a mean temperature of 80° for 40 days. Our own city of Natchez will furnish the facts without going further.

According to the meteorological table given by Dr. Parlee in his account of the yellow fever of 1817 and 1819, we find as follows,† viz.: That the *mean* temperature of July and August for sixty-two days, in the years 1814, 1816, and 1818,

\*See New York Med. and Phys. Jour., vol. 1, p. 398, 400.

†See Chapman's Med. and Phys. Jour., vol. 3, p. 17, &c.



was steadily from  $80^{\circ}$  to  $83^{\circ}$ , and yet no yellow fever occurred in Natchez in either of those years. In the year 1817, the mean temperature during July, for 31 days, was  $80^{\circ}$ —and during August, for 31 days, it was  $77^{\circ}$ —during the month of September, for 30 days, the mean temperature was only  $73^{\circ}$ —and yet the yellow fever prevailed with great mortality, having become epidemic not until the 28th of September. Again, in the following year of 1818, the mean temperature during the months of July and August, was for each,  $82^{\circ}$ —being 60 days steadily at  $82^{\circ}$ —and yet no yellow fever appeared in Natchez that year. Again in the following year of 1819, the mean temperature of July and August was for each,  $79^{\circ}$ —being for 62 days. For September following, the mean temperature was only  $75^{\circ}$ —and yet the yellow fever prevailed with great mortality; having become epidemic about the middle of September.

We might cite authority to any extent to show that the same state of atmosphere has existed under similar circumstances elsewhere. But we will make only one more reference to the tables of Dr. Tooley of Natchez, and he is proverbial for his accurate observations. In the year 1824, the mean temperature for July was  $86^{\circ}$  for 31 days; and for August  $82\frac{1}{2}^{\circ}$  for 31 days; thus giving an average mean heat of  $84^{\circ}$ —yet no yellow fever was known in the city. In the year 1825 the mean temperature for the month of July was  $81^{\circ}$  for 31 days; and for August  $83\frac{1}{2}^{\circ}$  for 31 days. Thus the general mean temperature was up to  $82^{\circ}$  for 62 days. This year the yellow fever prevailed with great violence as early as the 20th of August, or after 52 days of that mean temperature.

Thus it would appear, that although a continued high temperature is a necessary circumstance in causing an epidemic yellow fever, that *something else* super-added is requisite. In the year 1824, there was a less number of rainy days in August than in August of 1825\*—so that a deficiency of rain is not the cause exclusively.

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\*In 1824 there was rain 12 days in July; 9 in August. and 5 in Sept.  
 “ 1825 “ “ “ 12 “ in July; 11 in August, and 5 in Sept.

' If it were owing to a deficiency of moisture in the air, this could easily be obviated by watering the streets, repeatedly, as often as evaporation was complete. *Heat* is necessary to the generation and dissemination of yellow fever infectious air; but heat, if attended with much wind and agitation of the atmosphere, will not generate and diffuse this infectious air through a city.

At certain times there certainly is more or less of a general "epidemic constitution of the atmosphere" over an extensive scope of country. This peculiar condition does, doubtless, predispose the population in crowded cities and ports to certain grades of fever, and to yellow fever especially. But as to yellow-fever "epidemic constitution," we believe there is nothing very peculiar; nothing that can properly be called the *to thion* of Hippocrates, or the "*seminarium e cælo dimissum*" of Diemerbroeck. We believe that it is simply a condition of the air, which we can reasonably conceive of; and concerning which we may safely predicate a course of conduct, which will prevent, or protect a city from, an epidemic yellow fever.

This is simply a hot, sultry condition of the general atmosphere, whereby the circumscribed air of a town or city becomes charged with human and other effluvia, which become more concentrated by the absence of proper ventilation and change of air, until it becomes a fit *nidus*, or receptacle, for the reception and dissemination of what is properly *Yellow Fever infection*.

#### YELLOW FEVER IS A COMMERCIAL DISEASE.

This is a point already established, and it is necessary here only to illustrate that point from authority and by exemplification.

Yellow Fever, as an epidemic, is a disease peculiarly confined to seaport towns and cities in the United States; or to those places contiguous to which it has been transported in one form or another. It is found prevalent chiefly in seaport

towns and cities in the Southern portion of the United States. In those maritime towns, which carry on *no trade* with the West Indies, or with infected cities near the Atlantic seaboard, we find the people are exempt from this malignant disease. The interior towns which, by their location and natural circumstances, are debarred from direct water communication with the large commercial ports, and, from the West India trade, are uniformly exempt from all appearance of this disease.

So true is this position, in the United States, that we scarcely deem it necessary to confirm it by the citation of authority. The whole history and records of the medical profession, relative to the appearance of this disease as an epidemic, show conclusively that its ravages have been primarily in commercial ports, where there are frequent arrivals of vessels from West India ports and seas. Where it has appeared in towns which were not ports it can be shown that the disease was transported thither by persons already infected or by other means.

As Dr. Ramsay,\* of Charleston, remarks, "Yellow Fever is eminently the disease of cities." It proceeds from an atmospheric contamination, which is perfectly *harmless* to natives of the West Indies, and to those who have become seasoned or acclimated to it; but is poison and death to strangers with northern habits and constitutions.

Dr. Rush, with all his zeal to establish the local origin of Yellow Fever miasm, from putrescent vegetable matters, and from city filth, could not resist the evidence, forced upon him, that ships sometimes contained in their holds, a poisonous air which could and often did produce yellow fever about the wharves. Pressed on every side by such indubitable evidence, it is surprising to what additional sources of local effluvia he resorted, rather than abandon his favorite theory of local origin. After the epidemic of 1793, which he ascribed to putrid coffee, every visitation presented new apparent sources of miasm, as if to show the fallacy of his theory. Such were

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\*See Med. Repos., vol. 4, p. 100.

the diversity of circumstances, under which subsequent epidemics appeared, that he was compelled, in order to sustain himself, to *make numerous additions* to the former list of causes. To adapt his theory to the changing *phases* of circumstances, he is compelled to admit the *combined influence* of docks, sewers, filthy gutters, filthy yards and cellars; also every variety of animal and vegetable putrefaction, and, lastly, partially to admit, to a certain extent, the *real source*, which he denominated "*the foul air of ships*," diffusing itself into an atmosphere vitiated with exhalations extricated by "*great solar heat*." Not only this, but he was obliged to deny the peculiar character of the disease, and gave it the name of "Bilious Yellow Fever."\* With such arguments did he lead the judgments and prejudices of the people of Philadelphia, and of many theoretical physicans.†

Numerous instances were presented in the little trading towns and ports on the Delaware river and at different points on the Chesapeake where yellow fever had been introduced, without the sources to which Dr. Rush ascribed it in Philadelphia, and in which he was obliged to admit that "*the foul air from the ships acted as an exciting cause*." This ground was taken by those of the same school; and they admitted and contended that this "*exciting cause*" was frequently introduced in the vessels: and recommended such vessels to be quarantined, &c. Yet they still adhered to their former belief that this was not *contagion*, which appears only a specious term to cover their defeat. Dr. Rush finally was compelled to admit that a virulent infection could be, and had been, introduced by ships in the form of "*fomites*" in clothes, bedding, and in trunks, boxes, &c.

The same doctrine was advocated by "The Academy of Medicine, in Philadelphia." In a letter to Gov. Mifflin, of Pennsylvania, Dr. Philip Syng Physick, the President of the Academy, by order, unequivocally admits, and contends, that

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\*See his "Observations on Yellow Fever," addressed to the citizens of Philadelphia, in 1799, A. D. Also Med. Repos., vol. 3, p. 294-5.

†Also, Med. Repos., vol. 6, p. p. 156-7 and 162.



the yellow fever of 1798, in Philadelphia, was in part to be ascribed to "*the foul air discharged* from the ships Deborah and Mary," from St. Domingo—which island they left respectively on the 18th and 29th of July. Again he declares: "We are the more determined in our opinion of the foul air of the Deborah and Mary, being the cause of many cases of our fever, from *similar cases of fever having been often produced* from similar causes; *instances of which* we mentioned in our letter to you last year."\* Again he says: "To guard against *the frequent source of yellow fever*, from the *noxious air in the holds of the vessels*, we recommend the unlading of such vessels, as contain cargoes liable to putrefaction, and the discharging of the *ballast of all vessels* at a distance from the city, during the months of June, July, August, September, and October."†

In this and numerous other instances which might be cited the fact that vessels do, and have repeatedly brought yellow fever into ports and trading towns along the seaboard, is clearly admitted by Dr. Rush and other distinguished advocates of *local origin*; the fact of *importation* is established by their own testimony. Yet they rest their whole argument in the controversy upon the unimportant question: whether this pestilential air is solely the result of *human contagion*, or *personal infection*, in contradistinction, to an infectious air produced by certain natural causes?

To be clearly understood as we progress in our remarks, we conceive the following to be a good definition of *contagion* and *infection*, viz:

Contagion is a poisonous material, capable of exciting a peculiar disease in healthy bodies exposed to its influence; and emanating with *that capacity* or power, at all times and under all ordinary circumstances, from a body labouring under that peculiar disease.

Infection is some noxious gaseous matter, capable of exciting certain kinds of fever, *and not emanating in that form*; having the power of exciting the disease, from some proper-

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\*See Medical Repository, vol. 2, A. D. 1800, p. 327 to 331.

†Ibidem.

ties assumed after it had emanated from a diseased body. Such is the infection of yellow fever.

Whether yellow fever can be introduced and disseminated in a healthy port by vessels from infected West India ports, is a point which many yet deny. The evidence, however, in favor of importation is clear and conclusive, to those whose judgments are open to impartial testimony. There is a certain condition of atmosphere in cities and ports at times in the United States, when yellow fever infection will *not* readily spread and produce an epidemic. This is when the air is too pure, or too cool to disseminate the infection from a single point. There are other conditions of air in towns and cities, during the hot sultry season of summer and autumn, when this infection has spread rapidly from one or more points, and speedily induced an epidemic. These facts are well established. Even Dr. Rush, and many of his cotemporary disciples in the doctrine of domestic origin, admit that vessels have become thoroughly infected, and have communicated yellow fever to those about the wharves where they laid. True they contend that this infection was produced by some putrescent matters in the vessel or upon the wharf. But as to the fact of *the vessel being infected*, they entirely agree. If one vessel become infected, a dozen may. If one vessel can spread a malignant disease in a certain number of the population, a greater number of infected vessels may certainly spread that disease *more extensively*.

In adducing authority on this point we claim the full weight of their testimony with all impartial inquirers—because we have been careful to exclude the testimony of those who rank with contagionists. We have been careful to select the facts and admissions of those who are advocates of the theory for the local and domestic origin of yellow fever epidemics.

All testimony tends conclusively to establish the point, that ships, which have been long at sea in tropical latitudes, have occasionally become thoroughly infected with the miasm or infection proper of yellow fever, either while at sea or while in some West India port; that this infection has be-

come so concentrated as to produce yellow fever in its most aggravated forms, in those who have gone aboard from our shores; that such persons have taken genuine yellow fever and died with it, in five or ten days, after they first breathed the infected air of the ship, although at that time none of the sailors or hands on the ship, were laboring under that disease. In this manner doubtless, in some instances, has yellow fever begun to prevail in sea-ports, among the many who daily, unconscious of the infection, visit such ships while in port. In this manner, in many instances, have the first twenty or thirty cases been traced to intercourse with an infected ship, or to goods from the same. These first cases are generally persons near the wharves, draymen, day-laborers, and others who are engaged in assisting to unload the cargo. It is perfectly immaterial whether the ship brought the infection from a *foreign port*, or generated it during her voyage. If the air in her hold can be disseminated about the wharf, or even if it will cause those who visit the ship to die of yellow fever, it certainly is an *imported* disease to those who suffer.

A ship can certainly become infected, and much more completely than a house, or a district of a city. On shipboard, the air below is necessarily close for want of ventilation. We will not travel over all the mass of testimony which might be adduced: but will cite only a few instances in our own country, which are conclusive: for one unquestionable case, is as amply illustrative of the principle, as twenty.

Dr. Tully,\* one of the most scientific physicians of Connecticut, gives an account of a number of cases of yellow fever at Knowles' Landing, in August, 1796. This is a village on the Connecticut river, about six miles below Middletown, containing a population of about two hundred souls, and situated on a steep declivity, with spacious and airy streets, and not crowded with houses. The number of cases that occurred at this place was eleven, of whom nine died. Every case was clearly traced to communication with a vessel which had recently arrived from Havana, on board which one of the sailors had died with yellow fever on the voyage.

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\*See New York Med. and Phys. Jour. vol. 1, p. 153-8.

The whole number of cases occurred and terminated in the course of a fortnight; for the alarm excited by the appearance of a malignant disease among them, caused a complete and speedy desertion of the village, and non-intercourse with the ship. This village has always maintained the character of uncommon salubrity. Up to the arrival of the infected ship, no disease of any kind prevailed; and immediately on the ship being abandoned by the inhabitants, the disease ceased. The infection on board this ship was not generated by putrefaction of either animal or vegetable matter, as none existed on board; and Dr. Tully declares that she was perfectly clean; no such matters were found in the town, or suspected by any as the cause of the disease: the ship was the undoubted source, and none were attacked but such as had been on board. 'In this case had the weather been such as generally *precedes epidemic yellow fever*; and had the inhabitants not fled, but remained, and continued their intercourse with the infected ship, the town would doubtless have been visited with *epidemic yellow fever*.

Dr. Tully informs, us that many other cases occurred at the different places at which this vessel anchored in ascending the river, and always in those only who had been on board. He also informs us, that, for the last twenty-five years, scarcely a year has passed, in which one or more similar cases have not appeared at different points on the Connecticut river; all of which are clearly attributable solely to intercourse with vessels from the West Indies, or from Southern ports of the United States.

Dr. Bayley,\* health officer of the port of New York, gives an account of a number of cases of yellow fever which occurred in the autumn of 1821, at the "quarantine establishment," on Staten Island, six miles below the city. From the 8th of September until the 7th of October, twenty-nine cases and twenty-one deaths occurred; of the latter fourteen had black vomit. These were clearly traced to intercourse with infected vessels then lying at the wharf, and recently from the

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\*New York Med. and Phys. Jour., vol. 1, p. 27, 28, &c.



West Indies and New Orleans. The health of those about the "quarantine establishment" never was better, both immediately before and after these cases: nothing like bilious or remittent fever had been seen: neither marshes, nor filth, nor vegetable putrefaction existed any where in the vicinity. The cases were traced clearly to the ships, and to them alone; and each case occurred just five days, and one on the sixth day, after the particular exposure to the infected air of the vessels. A washerwoman and her two daughters took the disease, without having been on board the vessels. They contracted their disease by handling and washing the foul clothes and bedding of four men who had died of yellow fever, about four days previously. The bedding and clothes had been thrown aside until taken to her to be washed. She took the disease just five days after she had handled the clothes, and died on the fifth day of her disease; her daughters were attacked afterwards. In this case a favorable condition of the air would, no doubt, have caused it to become epidemic.

Dr. Bayley\* also gives us the case of the United States' brig *Enterprise*, infected with yellow fever, at the "quarantine ground," in 1822. This vessel was perfectly clean, and free from any animal or vegetable putrefaction. She arrived from Havana with ten cases on board; and immediately the sick were removed to the hospital, and the well were quartered on shore to avoid the infected air of the vessel. She was then thoroughly cleansed, ventilated, washed, and whitewashed with lime, in a tenfold degree; lime was slaked in her timbers in large quantities. Yet, after this purification, she retained the infection, and communicated the yellow fever to those who afterwards went on board; of whom five, out of eleven, died. The process of purification was again instituted. Artificial ventilation with windsails was constantly performed; water to the depth of several feet, was daily let in and pumped out: lime was strewed in the hold, and her timbers thoroughly whitewashed, and still the infection was not destroyed until cold weather. In this case, her own crew having taken

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\*New York Med. and Phys. Jour., vol. 1., p. 426-7, &c.

the disease first, the people from shore avoided the vessel and escaped the disease.

Another case is given by Dr. Kollock, and quoted by Dr. Rush, in which a vessel at sea, in tropical latitudes, engendered on board a malaria which finally produced yellow fever. This is the case of the United States' frigate General Greene, which became infected while on a cruise in the West India seas, and did not become disinfected until she reached the cold climate of Rhode Island. During the time she retained the infection, every kind of cleansing, fumigation, and ventilation, were used freely, but ineffectually. In this case, the vessel was new, and perfectly clean and healthy, when she left Newport, Rhode Island, on the 3d of June, 1799. She had on board a complement of two hundred and fourteen souls besides large quantities of provisions for a cruise in the West India seas. Having encountered a storm, soon after she put to sea, the vessel became leaky, and a noxious malaria was generated, during a subsequent period of unusually *hot weather*. At first, and for some days, the disease assumed the symptoms of a violent bilious fever, with no deaths until they arrived in the port of Havana; when immediately several cases began to assume symptoms of *yellow fever*. "After this period," says Dr. Kollock, "three, four, and five new cases occurred daily; and the violence of the symptoms seemed to *increase with the multiplication of cases*, during the six days she lay in port."\* Cases and deaths continued to multiply daily, until she passed the capes of Virginia, when the disease became gradually milder. The whole number of the cases was forty; and twenty of them died. In this case, an infectious air was generated in the ship's hold, by the number on board, during the hot weather and leaky condition of the vessel; and it appears that the "leaven" of infection was superadded at the port of Havana, either by persons going on shore, and contracting the disease there, or by the introduction of infected air, &c. Many other cases might be cited, in

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\*Med. Rep., vol. 4, p. 3.

which infection has been generated and carried in ships into ports, and there produced yellow fever in those from shore who entered on board, although the crew of the vessel, being acclimated, remained free from disease.

We will here make a few remarks again upon the generation of miasm on board ships in tropical climates. The confined air in the holds of ships is more likely to be exhausted by respiration, and charged with human effluvia than even a city; especially where there are many souls on board, who are often confined below on account of storms and winds. In them thorough ventilation is extremely difficult, and the temperature is almost constantly up to the miasm point. The infectious air is thus rapidly formed in many cases, and in this state, a vessel arriving at a port where yellow fever prevails, will be ready to receive the leaven from the infected air of the city, either by the crew visiting the infected districts on shore or by the introduction of the infection in the form of *fomes* in goods. The United States frigate General Greene, before referred to is a good illustration.

The temperature at sea in tropical latitudes is seldom below  $80^{\circ}$  of Fahrenheit, and often from  $90^{\circ}$  to  $100^{\circ}$  according to the degree of reflection and concentration of the sun's rays. By a register kept by Dr. Thos. Rodman,\* embracing thirty observations between the first of November and the fifth of December, at 12 o'clock, M., each day, between latitude  $22^{\circ}$  north, and  $22^{\circ}$  south, it was ascertained that the lowest temperature of the air was  $79^{\circ}$  and the highest in the shade  $86^{\circ}$ . The lowest temperature of the sea below the surface was  $78^{\circ}$ , and the highest  $84^{\circ}$ . The mean temperature of the air during that time, at 12 M. was  $83^{\circ}$ , and of the water  $81^{\circ}$ . Thus the temperature within vessels while in the tropics cannot be low enough to *destroy* or neutralize miasm, much less infection: the former requiring a temperature of  $50^{\circ}$  and the latter of  $32^{\circ}$  Fahrenheit. Thus however slowly it may be generated, it continues to accumulate until the ship enters a northern climate. This register was kept during a cool healthy sea-

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\*Vide Coxe's Medical Museum, vol. 1, p. 83-4.

son, when no disease was generated on board by hot, calm, and sultry weather; of course a much higher temperature in these respects is often experienced on board ships in the tropics; and the miasm and infectious air is often generated where no animal or vegetable putrefaction exists.

Infected vessels *do not always indicate their condition* by the disease developed *among their own crews or hands*. These may be perfectly seasoned to yellow fever miasm, by acclimation; or they may be natives of tropical latitudes, where yellow fever is indigenous, and consequently they may be protected against its influence by that kind of immunity.

Vessels have been known to leave West India ports, and after a long voyage, to arrive in ports of the United States, with all hands on board, in perfect health; and when none on board had suffered by yellow fever during the voyage. In these cases the infection had been carried into the hold of the ship in the form of *fomites*, by goods, beds, or other kind of freight, and, there confined, during the voyage in a close hot atmosphere, had become active and virulent. The hold being appropriated for freight alone, of course would be frequented little or none by the crew during the voyage, and would remain closed until the vessel arrived at her destined port. But so soon as she begins to discharge freight, the infected air is stirred up; and the hands and others passing into it are suddenly attacked with yellow fever and die. This has occurred too where no stench or putrid smell of any kind existed.

Dr. Bayley, for many years health officer of the port of New York, says: "I have known *many vessels* to arrive from ports where yellow fever prevailed, that were free from any unusually offensive smell, and their cargoes in a *sound state*: also vessels in *stone ballast*, from ports similarly circumstanced, *which were infected with the same contaminated air, that existed at the place they sailed from*, without its appearing to proceed from any foul materials generating it on board such vessels, that could be detected by the senses. The evidence of such infection was manifested not only by the crews and passengers, having died on board after leaving port; as these may



have contracted the disease before they sailed; but such of the crews as had apparently *resisted the malignant influence of such infected port, sickened and died of yellow fever, after they began to discharge the cargoes*, (which were in good condition) at the healthy port.”\*

In this case the infected cargoes confined in the holds generated a virulent infection throughout the hold of the ship during the voyage through the tropical seas. The crews and passengers not visiting the *hold*, of course escaped the disease, until the hatches were opened in the port of destination. Dr. Bayley states that “*in other cases vessels were infected; but that the crews being seasoned, or acclimated, have arrived direct from an infected port, and remained healthy during the voyage, and during the quarantine; the vessels being apparently in proper condition, and having no sickness on board, nor any sensible bad air; but so soon as other hands came to assist, or to be on board, they sickened and died of yellow fever.*”†

Again Dr. Bayley declares that on the other hand he has witnessed at the New York quarantine ground, “that vessels have arrived from *healthy places* in tropical regions, with cargoes of *animal and vegetable matters in a state of putrescency*, with great foulness and the *extrication of much stench*; yet *no disease* existed among the crews or in those who assisted in discharging the cargoes.”‡

Thus sustaining the doctrine, that the miasm or *infection of yellow fever on ship-board* as well as in cities and towns, is *entirely independent* of any *offensive smell*, or of any offensive or putrescent matters; and that those articles which throw off a putrescent stench are, in themselves, destitute of any power to produce yellow fever.

It is a point susceptible of proof, that towns and cities, even those in tropical latitudes, and upon the maritime borders of

\*See Dr. Bayley's letter to Dr. Townsend, in Townsend on Yellow Fever, p. 92.

†See Townsend on Yellow Fever, p. 93.

‡Ibidem, p. 93-4.

the U. States, *are not liable* to or endangered by yellow fever epidemics, provided *they have no commercial intercourse* with West India, or *infected ports*. Those towns and ports, which have good deep harbors, and enjoy extensive trade with tropical ports, are liable to annual or occasional visitations of yellow fever as an epidemic. Those too which are remote, or inaccessible to shipping, are known to be habitually *exempt from yellow fever in any form*.

Notwithstanding the general predisposition, or "epidemic constitution of the atmosphere" occasionally exists from Boston and New York, along the whole seaboard of the Atlantic to St. Augustine, and along the whole Florida coast, as far as New Orleans, and even as far as the Colorado, in Texas; yet we see yellow fever prevailing in only a few of them, and in those only which enjoy a constant commercial intercourse by water with West India or infected ports. Hence it has prevailed in New York, Philadelphia, Baltimore, Norfolk, Charleston, Mobile, and New Orleans, while scores of other points intervening are exempt and healthy. Nor does it prevail simultaneously in all of these. Why has it not prevailed equally in Albany, Harrisburg, Fredericktown, Washington City, Richmond, Columbia, or Tuscaloosa? Simply because it cannot reach them.

All these places and hundreds more are exposed to the same "epidemic constitution of air," in hot, dry, sultry summers; yet only a few are exposed to the *indispensable requisite*, "*the exciting cause*"—the *leaven* of infected air from ships, and infected ports.

Dr. Rush and others of his school, have repeatedly admitted, that the impure or miasmatic air which accumulates in the holds of ships at sea in hot, sultry summers, *is morbid*, and that in an impure or contaminated air, it may act as "*an exciting cause*" to induce *yellow-fever* in those exposed to its influence. So far as the people of such town or port are concerned, it can surely make little difference, whether this "*exciting cause*" be imported from a West India port, or whether it be generated in the vessel only three days before her arri-

val. And, if it has the effect of producing a malignant epidemic which they might and would otherwise escape, it could certainly be very little consolation to them to learn, that it was not the exclusive cause, but only "*the exciting cause*" of the disease; or even that it was produced by putrescent matters as the predisposing cause. City authorities would do well to exclude *such exciting causes*.

The only point remaining to establish the *importability* of *yellow fever* is, to show that this infected air, miasm, or by whatever name it be called, is capable of diffusing itself into the surrounding atmosphere near wharves, and thus disseminating the disease. Besides the possibility of this mode of disseminating the disease among the crowds who daily frequent the immediate vicinity of the ship wharf, there are many others who certainly contract the disease by direct intercourse with the ship, as laborers, merchants' clerks, draymen, and the like.

There are many subtile gases in nature, especially in diseases, which possess the remarkable and mysterious property of penetrating to a great distance through the atmosphere, and of insinuating themselves and combining intimately with it, in a manner beyond our comprehension. The wonderful diffusion of aromatic particles, and of the minute particles of all volatile matters of smell are familiar examples. By what force or power does the putrescent particles of decomposing animal and vegetable matters mount the winds and force themselves into every man's olfactories, whether he will or not? Other effluvia, far less sensible to our organs, diffuse themselves no less extensively through the air, and are detected only by olfactory organs far more acute than ours. The delicate and to us imperceptible odor of a deer or other living animal is thrown into the air hundreds of yards from him, so as to direct the hound in the chase. Although this to the hound is sensible and plain, it entirely escapes our senses. Why then should we expect, with our blunt sense of smell, to trace the mysterious and insensible aura which is thrown off in disease?

The only point remaining to establish the importability of epidemic yellow fever in ports, is whether the *dissemination* of the infected air of the ship in the vicinity of the wharf, among the crowds that frequent them, and reside near them, together with ten, twenty, thirty, or more cases, which were contracted by going on board such vessels, be capable of causing the disease to spread, among those contiguous, who do not go on board, and this when the temperature of the season, and the sultry, and if desired the miasmatic state of the air, is in the most favorable condition for disseminating the disease. Of this we think there can be no reasonable doubt. Dr. Rush, and his coadjutors in favor of the domestic origin of yellow fever, admitted that it might, and had occasionally, spread from ships in an impure air.

Dr. Mitchell,\* one of the most able advocates of the local or domestic origin of yellow fever, in a report made to Congress, February 25th, 1803, admits, and even contends that vessels often become highly infected while at sea; that an impure air is generated in the holds during *hot, sultry weather*, in tropical climates; that this infection may be communicated not only to those who go on board, but that the infected air may be *diffused in the atmosphere* about the wharves and shipping, and thus excite the disease more generally. He contends, very properly, against useless and idle detention at quarantine, when no disease or infection has been on board the vessel; but he urges the necessity of detention, and thorough ventilation and cleansing, in case of infection, until the infection is destroyed. In all this he denies the *foreign origin*, or infection. But is it not immaterial to those in sea port towns, whether the infection be generated on board, or contracted in a foreign port? If it can *spread* among those where the ship arrives, it is as important to guard against it as if it were of *foreign origin*. Dr. Rush unequivocally admits that there is much danger to be apprehended from "the foul air of ships," where cases of yellow fever have occurred. He also admonishes us, "to prevent the landing of *persons af-*

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\*See Med. Repos., vol. 6, p. 460, &c.



fectured with the ship fever, in our cities, and the *more dangerous practice of ships pouring streams of pestilential air from their holds upon the citizens, who live near the docks and wharves.*" Med. Rep., vol. 6, p. 166.

Again, in a communication from Dr. Rush and others to Gov. Mifflin, in relation to the yellow fever of 1797, in Philadelphia and Kensington, it is maintained, "that, *in addition to the filth and putrefaction about the city, the foul air issuing from the holds of two ships, (designated,) produced the yellow fever, independently of foreign contagion.*" Again, the authors declare, that "the close, unventilated holds of ships, after *long voyages in hot climates*, with perishable matters on board thrown open in a *heated, sultry atmosphere*, are a fruitful source of miasm: although they infer, that "yellow fever has not been *so often* propagated by *contagion*, as has been supposed." See Med. Repos. vol 2, p. 95, 96.

Without multiplying authority we will cite one case which is full of instruction to those who preside over the port police of our cities. We mean the "yellow fever" of New York in the summer and fall of 1822. This epidemic, if it could be so called, commenced by scattering cases from the 15th to the 20th of July, and cases multiplied gradually until the 15th of August, when it was considered epidemic. The whole number of yellow fever cases, from the 15th of July until the 1st of November when it ceased was about four hundred and thirty; of whom about two hundred and fifty died. It began in Rec-tor street, near the wharf, where four ships' cargoes had been discharged from infected vessels a few days before. From this point it spread very slowly over several squares in the vicinity, having extended only a few squares in thirty days; while the remainder of the city was unusually healthy. The squares over which it prevailed most fatally, were bounded by wide, clean, and airy streets, and the most substantial buildings in the city; no filth could be found in the vicinity; the infected air from the original infected point having been wafted thither by the winds.

These are the facts without speculation, viz: the first cases

began between the 15th and 20th of July. Between the 1st and the 9th of July, the cargoes of four infected vessels from Havana, were discharged at the wharf at the foot of Rector street, and stored in warehouses. Two of these vessels had lost some of their crews by yellow fever, on the voyage; the crews of the other two were Spaniards and acclimated sailors. During the first two weeks of July, the weather was very warm, the sun cloudless, and the air "*very calm and sultry.*" During the months of July and August, there were almost daily arrivals of other vessels from Havana, and other ports where yellow fever was known to be prevailing. During this period, the number of vessels from West India ports was unusual; because, on account of the terror of pirates, they came in companies, under the convoy of battle ships. The following are the arrivals at the quarantine ground, between the 11th of June, and the 17th of October, viz: From Havana, eleven vessels, having, or having had, on board forty-four cases of yellow fever and twenty one deaths; from Matanzas, one vessel, with three cases of yellow fever; from St. Jago, two vessels, having had three deaths from yellow fever; from Port au Prince, St. Domingo, four vessels, with six deaths from yellow fever; from Vera Cruz, between July 17th and 28th, three vessels, with nineteen cases and two deaths from yellow fever, before arrival. Besides these, there were, during that time, about forty other vessels from Southern and West India ports, whose crews, being Spaniards or acclimated seamen, had no cases during their voyage, although the air in some of the vessels proved infectious to those who were unacclimated.

If any one will take the pains to examine the accounts of this epidemic, as detailed by Dr. Townsend,\* Dr. Bayley, and Dr. Walters, and after making every allowance, especially to Dr. Townsend for his views of contagion, of that charity which the advocates of the *exclusive local origin* of yellow fever are so ready to bestow, he will find ample reason to admit that the atmosphere about the wharves was *contaminated by the infectious air imported in ships from tropical climates.*

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\*See Med. Repos., vol. 4, p. 7 & 8; also, vol. 3, p. 46 &c., A. D. 1800.

A case presents directly in point, on this subject, as well as in relation to the agency of putrid exhalations and marsh miasm in the production of yellow fever. The town of Campeachy is situated on the Gulf of Mexico, in latitude  $19^{\circ} 45'$  N.—Vera Cruz is situated about three hundred and fifty miles distant, but in about the same latitude. Campeachy is healthy, and Vera Cruz is visited annually with yellow fever. The circumstances generally considered most favorable to the production of yellow fever, are equal in both places. Campeachy is built mostly of stone, upon a substratum of limestone rock; the soil of the surrounding country, as well as a part of the town, is a sandy loam, and often becomes very muddy; the town is surrounded by a stone wall about ten feet high; the streets are wide; the houses are large and airy; on the back part of the town, there is a high hill, or moderate mountain, which greatly interrupts ventilation, so that the inhabitants suffer greatly, from “all the inconveniences of a sultry, confined air.” “In front of the middle of the city, is a large wharf or mole, extending one hundred yards into the water. Along this mole, there is constantly deposited large quantities of filth of every kind, together with “large quantities of *putrid fish*.” “When the tide, (which rises and falls two or three feet,) retires, all these matters are left exposed in the mud, and on the shore, to the direct rays of a vertical sun, until the stench is intolerable to strangers.” Besides these things, there are also other “accumulations of filth in other parts of the town.” Yet “the inhabitants are very healthy;” there is only one physician in the place, and he has not half employment in his profession, although “the population is about ten thousand.” (See Med. Rep. vol. 4, p. 5–8.) Vera Cruz is situated upon a sandy plain, with sand hills in its rear; contains no more filth than Campeachy; the air is no more confined or sultry, the inhabitants are no less temperate, yet Campeachy is healthy, and Vera Cruz is annually visited with yellow fever of the most malignant type. (See Med. Repos., vol. 4, p. 7 and 8; also, vol. 3, p. 46, &c. A. D. 1800.)

How is this paradox explained? Campeachey has an extensive, but shallow harbor, so that large ships cannot approach near the town; only boats and small craft can enter the harbor, such as do not exceed fifteen or twenty tons. Hence, so far as commerce with remote regions, and the foul air of large ships, from long tropical voyages, are concerned, it is equivalent to an inland town; and it is also free from the crowds of *strangers*, who infest large commercial ports. But Vera Cruz carries on an extensive commerce, has a fine deep harbor, and thus does not lack for infected air from ships, and crowds of strangers upon whom it operates. These, when attacked, contribute to the infection, which is like "leaven" in the contaminated atmosphere, and assists in producing the epidemics. (Ibid, p. 78.)

Although the yellow fever is endemical all the year in Cuba, it is almost exclusively confined to the commercial ports. The elevated savannas of the interior are as much a stranger to it, as our own interior towns. In the ports, it attacks principally strangers, and prevails mostly from the beginning of July to the middle of November. When there is a great influx of strangers, it becomes more malignant, and finally attacks many of the acclimated inhabitants, especially such as are exposed to the ordinary exciting causes of fevers. It is believed, among the people of Cuba, that the influx of strangers, and their numerous attacks from yellow fever, contaminates the air, or infects it, and causes it sometimes to become epidemic, when otherwise it would not have prevailed.

#### THEORY OF YELLOW FEVER MIASM.

To produce yellow fever as an epidemic in our cities, we conceived three circumstances or grades of action necessary:

1. *Miasm*, or the simple basis, which uncombined we think harmless.

2. The union of miasm with impure air, or with air which has been exhausted by respiration, and charged with human effluvia. This combination we term *malaria* or *infectious air*. This is the proper nidus or receptacle for the dissemination



and extension of personal infection; and is *always requisite* for the spread of this disease as an epidemic.

3. *Infection*, or the union of personal infection with *malaria* or infectious air. In this state the poison becomes active, and constitutes the efficient, predisposing, and exciting cause of epidemic yellow fever. It constitutes an *aerial poisonous ferment*, extremely subtile in its nature and properties.

These views we will endeavor to illustrate as we progress. The term *miasm*, as an agent in the production of yellow fever, we use in a sense somewhat different from its common acceptation, and, as we think, with equal propriety and reason.

I. *The Miasm of Yellow Fever*.—This we believe a subtile, gaseous, invisible and inodorous matter, generated by the action of the sun, or by solar heat, upon *common atmosphere*, independently of any effluvia, feter, or exhalation from the decomposition of animal matters, or of any exhalation from marshes, dry earth, or vegito-animal compounds, or any of the commonly received sources of miasm. We believe it the result of some unknown combination of the solar rays with portions of the atmosphere, in certain situations, and under certain circumstances. These circumstances are, that the air shall be to a certain extent confined or stagnant; such as we have in cities in sultry oppressive weather, when the temperature in the shade is steadily above  $90^{\circ}$  of Fahrenheit during some portion of the day, or above  $125^{\circ}$  in a fair exposure to the open rays of the sun. The precise nature of this combination we are unable to explain satisfactorily. The doctrine of marsh-miasm conceives something generated by a similar process. We suppose this miasm to be perfectly free from morbid properties in its *simple state*, but that it becomes morbid by combination with impure air; that by its specific gravity it becomes particularly separated from common air, and settles near the surface of the ground, and in low, damp, confined places, similar to collections of carbonic acid gas; that it is entirely neutralised by a temperature of  $45^{\circ}$ , and is partially neutralised by a temperature as high as  $55^{\circ}$ ; that it generates slowly, and only while the temperature is above  $90^{\circ}$  in the shade.

Hence we infer that it can accumulate only after several days of continued high temperature, during a period, and in situations where the extreme heat by day in the shade is above  $90^{\circ}$ , and the lowest temperature at night is above  $55^{\circ}$ . We suppose, judging from all the circumstances of weather, preceding all the epidemics of this kind in the United States, that it will not accumulate in prejudicial quantities, in less than 10 or 12 days of unremitted hot, calm, and sultry weather, such as we have described; that whatever amount may have accumulated in any number of successive hot days, will be destroyed or neutralised by one cold night, with the mercury at any time below  $55^{\circ}$ ; or a strong wind, or a tornado, would disperse or waft it off. Hot weather favors its generation, and calm weather its accumulation.

We believe it requires a temperature of  $90^{\circ}$  in the shade for its generation, because the yellow fever has never spread as an epidemic in any place where the mercury of Fahrenheit by day had not ranged up to  $90^{\circ}$ , for at least 10 days previous to the epidemic, with a night temperature above  $60^{\circ}$  in the coldest exposure. We infer that one night, in which the mercury would sink to  $55^{\circ}$ , would destroy all that had accumulated in a week.

The *mean* temperature, as generally estimated, is no test—*no criterion*, but the *actual highest range of the mercury by day and by night*. We infer that the miasm once accumulated is not injured by damp, or foggy air, unless the temperature fall below  $80^{\circ}$  by day and  $65^{\circ}$  by night. If several days of damp, foggy, or misty weather, with high temperature, succeed a week of hot, calm, and sultry weather, the miasm previously generated remains in *statu quo*. Low damp situations in cities attract and retain it.

This miasm is seldom generated in our latitude, except in cities and towns, where the temperature in summer is always at least  $3^{\circ}$  or  $4^{\circ}$  above the temperature in the country; and this increased temperature is produced by the great amount of reflecting and radiating bodies in those places.

The miasm accumulates in the West Indies, more or less during at least six months in the year, because the temperature during that time is always above the point requisite for its neutralisation; and for more than nine months in the year, the temperature is not reduced to the point requisite to destroy or neutralize *infection*, or to  $32^{\circ}$ .

We infer this miasm is innocuous in a pure and often renewed atmosphere, because we find that in many cities and towns, when there has been free ventilation, there has been no epidemic yellow fever, although the mercury has ranged as high as  $90^{\circ}$  or  $93^{\circ}$  for several days together; but under the same temperature, with a stagnant atmosphere, constituting sultry weather, there has been yellow fever in its epidemic form. Stagnant atmosphere in a city becomes rapidly contaminated, where probably 100 or even 500 persons to every acre of surface are each incessantly respiring the air, besides the constant exhalations from their bodies. By these means alone, the mass of atmosphere in a city would become perfectly saturated with these exhalations in the space of a few days of sultry weather, besides being exhausted of its oxygen or vitalizing principle, whatever it be. The miasm uniting with this kind of atmosphere, becomes slightly morbidic, and predisposes to yellow fever—but not to *bilious fever*, as we shall show hereafter.

In this state it becomes *infectious air*, or *malaria*; and this air, confined in a high temperature, and combined with the morbid effluvia from a patient laboring under yellow fever, after a few days acquires active morbidic properties, which will produce malignant yellow fever in those who are unacclimated to such air.

When the air of a city is prepared for this morbidic combination, the introduction of a few cases of yellow fever, or beds, and large quantities of porous and woollen goods from an infected part of the city, will greatly increase the danger of an epidemic yellow fever in such place.

II. *Malaria or infectious air*.—We have said that this union of miasm with the contaminated air of cities in hot sultry

weather, predisposes to yellow fever; and the longer the duration of such weather the stronger will be the predisposition, and *cæteris paribus*, stronger in *strangers* than in resident or acclimated persons.

The whole population of the city or town may labor under this predisposition, and yet remain healthy and unconscious of danger; and if nothing occur as *exciting causes*, they may escape an epidemic, or even sporadic cases. But on the contrary, some cases will be excited into action by extraordinary circumstances of fatigue, exposure, or by some imprudence.

Every case, *however excited into action*, sporadic or otherwise, increases the danger and the predisposition, in those immediately about the sick. At such times, the presence of a large number of *northern strangers* in the city is one of the most dangerous circumstances, and tends more than any thing else to lead on the epidemic: because the atmospheric predisposition, which would be innocent to the resident population, would excite sporadic cases in the strangers; and every sporadic case at such time increases the virulence of the local malaria, and thus hastens on the epidemic. Each patient with yellow fever at that time, throws off into the local atmosphere of his room, an effluvium, a subtile gaseous emanation from his body, which tends strongly to render that atmosphere morbid; and if that room be closed for several days afterwards, with a steady temperature between 85° and 90° of Fahrenheit, the air in it will become infected, and will produce yellow fever in some of those who may enter and breathe it only for a few minutes, and especially in such as are not acclimated. When the general atmosphere in the vicinity is becoming assimilated, strangers and unacclimated persons will be among the first, if not the very first, victims.

But, at such time of general predisposition, if steamboats, charged with infected air from an infected port, and freighted with goods and passengers from the infected district, arrive daily at the wharves, and discharge those goods and passengers who have already imbibed the disease; and are also visited by scores of the idle and curious, besides those whose



duty requires them to be on board, we shall soon see what are called sporadic cases springing up in different parts of the city, and chiefly, too, in those who *have been* in the vicinity of the wharves or *on board* the steamboats. Thus the epidemic yellow fever is always ushered in, not only at Natchez, but at all other points where it occurs on the lower Mississippi.

Hence, we conceive after miasm is formed, the *first stage* of contamination is produced in the general air of a city by the respiration, and the exhalations from human bodies *in health*; the *second stage*, by the emanations from the same laboring under this peculiar disease; and this constitutes *infection*, which is a virulent atmospheric poison.

III. *Infection*.—When the local atmosphere of a city, town, or even a house, has gone through all the previous stages, it possesses very virulent qualities, and assumes properties which are peculiar to it in this state. It then has become infection; and in addition to its morbid qualities, it has the property or power of extending itself in an impure atmosphere, or of assimilating to itself a certain portion of the contaminated atmosphere around. Portions of this infected air may be transported from one place to another, and then introduced into contaminated air, it will assimilate a circumscribed portion of it, until the latter will possess the same morbid properties as that which was introduced. This process we conceive to be a “gaseous ferment.” Dr. Cartwright calls it the “assimilating process.”\*

We call it a gaseous ferment from the analogy which appears to exist between its operations and those of the common carbonic acid gas fermentation: like it this infection requires a certain basis for its action; it requires a certain degree of temperature for a certain time, with quietude. In both a certain process, the fermentative, will at length be completed; but when this process is complete, a small portion of the product, introduced into a similar basis, and in similar temperature, will excite the process of fermentation or assimilation much

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\*Medical Recorder, Vol. ix. pp. 9 and 10.

more speedily, and probably at a lower temperature than was required in the first process without the *leaven*. In all these particulars, as well as others, the analogy holds good.

Without the proper basis for the action of the assimilating process, the infection ceases to extend itself; thus it cannot extend the sphere of its virus without contaminated air, or through a pure atmosphere; for, as Dr. Paloni of Naples observes, relative to the yellow fever of Leghorn, which desolated that city in the autumn of 1804, “the infection of this fever is of such a constitution, that *pure and renewed air decomposes its fomes*, at a small distance from the sick; on the other hand, *air that stagnates, and is replete with animal exhalations, easily becomes a vehicle for it*. Hence it happens, that as soon as the disorder broke out, we saw it rage most fiercely in the *most filthy and least ventilated* parts of the city. *Pure, fresh, renewed air, destroys its infection.*”\*

This is precisely what we contend for, viz: that yellow fever is *not infectious in a pure, free air*, and that it is *infectious or communicable in a contaminated atmosphere*.

We have already alluded to the diverse and opposite sources of yellow-fever miasm, as adduced by the advocates of its domestic origin in contradistinction to its introduction from infected ports or by infected vessels. There are scarcely any two ports or towns where it has been ascribed to the same combination of local causes. In every place where it has prevailed the source has been peculiar; no two epidemics have been produced by the same local causes, if the theories of gentlemen be correct. All the speculations and theories that have been adduced in favor of its local origin in any port or town in the United States, have had an advocate in Natchez or New Orleans; none having been too weak or too absurd to find a friend or admirer here.

We ascribe the epidemic yellow fever of Natchez and all our south-western towns, to one and the same cause, or to the same combination of circumstances, which are as follows:

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\* Medical Repository, Vol. viii. pp. 426—7, &c.

1. Hot, dry, and sultry weather during August and September; but especially for 15 or 20 days in succession, immediately preceding the epidemic visitation; during which period the mercury of Fahrenheit shall range regularly as high as  $90^{\circ}$  by day, and above  $70^{\circ}$  at night, with that peculiar feeling of the atmosphere which is generally termed *oppressive*—or as Dr Cartwright designates it, a “breathless state of the atmosphere.”\*

2. The existence of yellow fever as an epidemic in New Orleans, at least 10 days before it appears in Natchez.

3. Regular, daily and uninterrupted steamboat communication with New Orleans.

4. A general state of salubrity in the city up to the outbreak of the disease, and the same state of salubrity through the country generally, both before and during the epidemic.

5. Public attention diverted to imaginary causes in the city, and apprehension quieted by a reliance upon the security gained by the removal of certain imaginary sources, and the prophylactic virtues of lime; while the real danger of importation is disregarded. These we believe to be the most invulnerable circumstances which precede epidemic yellow fever in Natchez; and Natchez was a stranger to these visitations previously to the autumn of 1817, which was soon after the introduction of steamboats on the Mississippi river.

As this was the first time that Yellow Fever was known as an epidemic in Natchez, I will give a short notice of it, for which I am indebted to Dr. Perlee, one of the most able physicians of the city for several years.†

*Epidemic of 1817.*—Occasional cases were seen in Natchez as early as August preceding the epidemic; but where they contracted the disease I have not been able to learn. The summer had been very hot, with occasional showers up to the first of September, with a sultry condition of the atmosphere afterwards. Dr. Perlee says, “the weather had been such as

\* See Medical Recorder, Vol. ix, &c.

† See Chapman’s Medical Journal, Vol. iii. p. 6.

*predisposed* very strongly to violent disease, even early in September, and required only a small concentration of power to produce a sweeping epidemic." There had been no uncommon sickness, except this "strong predisposition to violent disease," which no doubt the Doctor thought he perceived. "At this time, when the population was *highly susceptible*, the Washington steamboat reached us from New Orleans, with persons on board, ill of yellow fever, some of whom were landed; and several young men from town went on board, who were all taken sick soon after and died. *The disease spread rapidly and with most destructive malignity.* For some time it had its sway over the whole city. On the 28th of September the physicians publicly announced the existence of yellow fever, and a large portion of the population retired to the country." It continued to prevail with slight interruptions until the 9th of November; and several cases occurred six days later in those who returned after frost to their houses which had been closed during their absence.

The whole number of deaths in the city, during this epidemic, was one hundred and thirty-four; besides some in the country who contracted their disease in the city.

The "predisposing causes" to which Dr. Perlee ascribed this epidemic, are the exhalations from stagnant pools, from city filth, from newly made ground in levelling the streets, and from an old grave-yard near the middle of the city. This heterogeneous mixture of effluvia, he supposed, produced the high state of "general predisposition," and prepared the inhabitants for an epidemic; and required only the aid of some *exciting* cause to produce a "sweeping epidemic." Although he was an advocate for the local origin of yellow fever, and would not ascribe it under any circumstances to importation, he leaves us to infer that the Washington steamboat with her yellow-fever patients, and her infected cabin, was the exciting cause which alone was wanting up to that time. In this we cordially agree with him, and believe that the same degree of predisposition, without similar "exciting causes," would every summer pass off without an epidemic. Although Dr.



Perlee was an advocate for the local origin of this disease, he evidently considered the arrival of the steamboat *Washington* as an important incident in the history of this epidemic. At that time not more than a half dozen steamboats were on the Mississippi, and the arrival of this boat from New Orleans was a matter of much interest and curiosity; so that many went on board to gratify their curiosity, and thus aided in introducing the disease into the city.

*The epidemic of 1819* was the next visitation. It began on the 4th of September by a few scattering cases, and was not considered epidemic until the 14th of September. It continued to prevail with great mortality until the first of December, when 200 persons had fallen victims to its fury.

Dr. Perlee ascribes this epidemic to the atmospheric predisposition generated by similar causes to those enumerated in the last epidemic. At this time steamboat arrivals were so common that he does not refer to that as an exciting cause.

In 1819, the yellow fever raged with great violence in New Orleans, from and after the middle of August. Cases had occurred occasionally on board the shipping and about the wharves as early as June. Toward the middle of August it raged severely among the shipping and spread to the adjacent streets, and also to the boats which had descended the river. *Not a ship escaped* without the loss of one or two hands, and some lost their whole crews; many steamboats became infected, and lost many of their passengers and crews. It was not entirely destroyed until January following.\*

During the years 1820, 1821, and 1822, Natchez was exempt from yellow fever epidemics; yet the writer is well convinced that during each of these years, and especially in 1822, there were several deaths from this disease in the city which were traced to infection from New Orleans introduced in bales of blankets and other woollen goods, and some cases in persons who visited New Orleans on business, and were attacked after their return.

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\* Medical Repository, New Series, Vol. vi: pp. 6—20.

*The epidemic of 1823.*—This was probably the most terrific that has ever visited Natchez, or any other city of its population. The first cases occurred between the 12th and 20th of August. It continued to rage with great mortality until checked by frost near the first of November. By that time about 320 souls had died from this disease.

The weather for some weeks preceding this epidemic was very warm and oppressive. Dr. Cartwright says the weather in August presented each day, "several hours at a time attended with a breathless state of the atmosphere."

This summer yellow fever made its appearance quite early in New Orleans: many cases occurred among the ships' crews and others about the wharves as early as July; and it became epidemic about the first week in August. The arrival of steamboats from New Orleans was a thing of daily occurrence before the epidemic put a check to all kinds of business.

As soon as the disease was pronounced epidemic in Natchez this summer, as usual every family who had the means of escape, left the city. A few days afterwards, when the disease began to rage, ten or twelve families, including about sixty souls, removed to a cross-roads near Washington, known as Coonville, and there erected sheds and huts for a temporary residence. Being of the poorer class, they brought with them their beds, clothing, and all their movables, which were crowded into their small, ill-ventilated apartments. Here they remained in apparent security for a week or ten days, when cases of yellow fever began to develop among them. In a few days it spread among them with great mortality, and in a few weeks there were about twenty deaths among them, besides as many recoveries. The disease assumed its most malignant character here, and was precisely the same disease that prevailed in Natchez, and was equally fatal. At this time the whole country was as healthy as usual, and no disease of the kind existed any where, except where the infection could be traced to Natchez. However, at length the air of the encampment at Coonville became infected, and was avoided by persons in the vicinity as carefully as the air of Natchez itself

But in the meantime five persons who had visited Coonville, and had been exposed to no other source of infection, contracted the disease and died in the country. It was admitted that the air of Coonville was as strongly infected as that of Natchez itself.

In this case the infected air of Natchez in the form of *fomites*, contained in beds, bedding, clothes, &c. was carried out and confined in these crowded, ill-ventilated wooden huts, until it took on the assimilating process, and produced an epidemic, which would have spread as readily through five thousand persons if they had been congregated there. No one ever presumed to ascribe this little epidemic to city filth, grave-yards, or putrid bacon.

Dr. Cartwright, in a lengthy essay published in the Medical Recorder, ascribed the epidemic in Natchez this year to a lot of putrescent bacon in the south-west part of the city, aided by other putrescent animal matters supposed to have existed about the city.\* As to the bacon, I have long since been assured by Col. Fleming Wood, the alleged proprietor of the bacon, that the information on that subject was entirely erroneous; and that no such lot of bacon was in the city. Scarcely any one is sufficiently credulous, or so biassed by theory, as to believe that Natchez, which is known to be one of the most cleanly cities in the South, should be so infested with carrion, and other putrid matters, as are supposed to be necessary to bring on an epidemic. If any stranger were credulous enough to entertain such a belief, he would at once repudiate the idea when he should learn that Natchez has long been rather remarkable for the number of half-starved, rapacious vultures, which hover round in anxious expectation of such matters, which they devour in less than half the time required for the same performance by northern carrion-crows.

In 1824, the city was free from an epidemic.

*Epidemic of 1825.*—This epidemic began under the hill, or at the landing, among the clerks of a commission house and

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\* Medical Recorder, Vol. ix: pp. 5—7.

others near the steamboat landing. Cases began to multiply about the 20th of August. Several persons attacked were removed by their friends into the upper city, where they finally died. On the last of August the alarm was such, that a general flight of the citizens to the country ensued. The disease prevailed nearly two weeks near the landing before it began to spread in the upper city; and the first cases in the latter were easily traced to intercourse with the landing.

The disease continued to prevail until checked by a freeze on the first of November. The whole number of deaths in Natchez was about 150 souls. As usual, several deaths occurred late in November in persons who had left the city early, and returned after frost into their houses, which had remained closed.

This year the disease was carried to Washington. This is a pleasant, elevated, and cleanly village, six miles east of Natchez, containing about 100 hundred houses thinly distributed over a space half as large as Natchez. It had heretofore been the retreat of the merchants, mechanics, and others who wished to continue their trade with the country. This fall Washington was crowded with people, goods, and all the movables necessary for business and house-keeping. Nearly half the mercantile establishments carried their goods along, and every day for ten days brought out new supplies from Natchez and New Orleans. No unusual sickness prevailed in Washington or in the surrounding country. During the first twenty days of September, the mercury ranged as high 90° to 93° each day, and the air was sultry and oppressive.

During the first ten days after the arrival of the Natchez people, there were about 8 deaths from yellow fever in those who had contracted the disease before they left Natchez. About this time others who were citizens of Washington and who had not been in Natchez, began to sicken with yellow fever; and by the 18th of September the disease was considered epidemic in Washington, when nearly all the population fled.

The whole number of deaths in the Washington epidemic



was about 60 souls. About ten cases and five deaths occurred among those who returned into houses which had been closed, and were not entirely disinfected by the cold weather.

Previous to this summer, Washington was known as a healthy retreat to the people of Natchez during their epidemic visitations, where the disease had never been known to spread. No one pretended to ascribe this epidemic to filth, or the usual sources to which it is ascribed in cities. Washington is remarkable for the absence of every thing like city filth.

Dr. Cartwright, however, did ascribe it to a quantity of "putrescent bacon," which he alleges to have been carried out from Natchez. Even this would be an admission that the disease was carried from Natchez to Washington. But the fact is, there was no such "putrescent bacon" as that to which he refers. The writer was an eye-witness to the whole of this epidemic, and resided within one hundred yards of the alleged putrid bacon, and he does not hesitate to say that the Doctor was misinformed on that subject.

I hesitate not to declare it as my belief, that there would have been no epidemic in Washington, unless the people and goods from Natchez had been crowded into it. Besides it must be remembered the merchants received large supplies of fall goods from New Orleans while they were in Washington, and among these were 8 or 10 bales of blankets to meet the annual fall demand of the planters.

The first citizens of Washington attacked were my patients; and their infection could be traced clearly to opening and handling those bales of blankets, and other goods brought from New Orleans and Natchez. The disease was imported to Washington as surely as it was to Coonville in 1823.

The intercourse between Natchez and New Orleans was uninterrupted: goods were almost daily received at Washington on the same day they were landed at Natchez.

Dr. Cartwright ascribed the epidemic this year, to causes similar to those which he adduced in 1823; to which he added "spoiled porter," "rotten sour-crust," and also a boat with some corn in it sunk near the wharf.

Dr. Merrill ascribed it to "loose earth" exposed to the sun, in making and filling up a wharf, and in levelling the streets. Others ascribed it to such combination of circumstances or causes, as their fancy might suggest. These causes had no agency whatever in producing the epidemic; and we have shown already that such causes are harmless as generators of yellow fever miasm. We assert without fear of successful refutation, that whenever these circumstances have synchronised with a yellow fever epidemic, they were only incidental occurrences, and not in any manner essential to its existence. It is certain that several epidemics have appeared in Natchez since 1825, without either of the causes assigned by Dr. Cartwright or Dr. Merrill.

It has been urged against the doctrine of importation, that in 1823 and 1825, previous to the visitation of the epidemics, there was a regular quarantine against boats from New Orleans. I admit there was a mock quarantine, but none that was effectual. Each boat from New Orleans at that time was required to round to at the quarantine ground, and permit the health officer to inspect her, when she passed on up to the landing at Natchez. It is well known, that although boats were subjected to this formality, no one was ever prohibited from discharging either freight or passengers. There never was a quarantine at Natchez, *on proper principles*, until the summer of 1841, and that quarantine excluded the disease from Natchez, although it was carried on to Vicksburg. We will speak of this again.

The next epidemic visitation in Natchez was in 1829. This was the mildest epidemic ever known in the city. The city was deserted early and the disease did not spread extensively.

For several years the city of Natchez escaped the visitation of yellow fever until the fall of 1837, when it again made its appearance.

*The epidemic of 1837.*—This began with a few cases called sporadic, about the 8th and 10th of September; and by the 15th it was considered epidemic. Many of the physicians denied

the existence of yellow fever in the city until several cases terminated fatally with the genuine black-vomit, which none could dispute. The disease continued to spread gradually and with occasional abatements, until checked by frost about the 25th of November. The number of deaths from this epidemic was about 280, including hospital cases, many of which had been landed in a moribund state from steamboats direct from New Orleans. The epidemic this year was more mild and slow in its advances than usual, until the middle of October, when it began to rage with great malignity. This season the first cases in September frequently assumed some of the symptoms so mild that it was declared by some to be *bilious fever*.

The city of Natchez was as healthy as usual until the cases began to multiply; and it must be remembered that there were many cases of yellow fever landed from steamboats direct from New Orleans for ten days before any cases appeared among the residents of the city. The Natchez Hospital had been opened for the reception of indigent boatmen and others; and scarcely a boat passed up from New Orleans at this season of the year, that did not leave some yellow-fever patient at the hospital. It is a well-known fact on the lower Mississippi, that from the time yellow fever begins to occur in New Orleans, almost every boat that passes up leaves one or more yellow-fever patients at Natchez to be removed to the hospital, in passing to which they are carried through the most populous part of the city.

For several years previous to 1837 the Natchez Hospital had been closed against the reception of sick from the boats; and during this time there was no epidemic. But, a year before, the legislature had made provision for throwing open the hospital to the indigent sick; and it was in full operation when the yellow fever broke out in New Orleans, and scarcely a day passed without the reception of one or more patients from ascending boats, after the first of June; and after the first of August nearly all these were yellow-fever cases.

It may be worthy of notice here, that in the summer of 1841, when the quarantine was adopted, the hospital was closed, and no patients permitted to land from the boats, unless at private houses. As a general remark, there has never been yellow fever in Natchez unless when the hospital was open for the reception of indigent boatmen and others from the river. When the hospital is open, it is an inducement for all the steamboats passing up to land at Natchez, if for no other purpose than to relieve themselves of the sick, whom they might have to bury on their way above.

#### YELLOW FEVER IS NOT ENDEMIC IN THE UNITED STATES.

By this I mean to say, that *yellow fever is a specific disease*, having no perfect analogy, or any characteristic symptoms which identify it with bilious fever, which is endemic in the United States.

The circumstances under which these two forms of disease prevail are widely different; the persons liable to each are different; the times and places where each prevails are different; the symptoms and pathology of each are different; and the impression left upon the system after recovery, is different; a mild case of yellow fever is not a bilious fever; and a severe and malignant case of bilious fever is not yellow fever.

The following are some of the principal points of difference between the two diseases—viz:

1. *Bilious fever* prevails in the south, chiefly in hot and showery weather, and more commonly in May, June and July; but sometimes in August and September. *Yellow fever* in the United States, never prevails as an epidemic until late in July, and generally, not before the middle of August or September; and always after a hot, dry, and sultry state of the weather.

2. *Bilious fever*, at times, prevails over certain districts of country, and generally among a sparse population, and is more common in country situations than in towns or cities. *Yellow fever* is confined as an epidemic, exclusively to towns



and cities, and appears *first* in commercial ports and large trading towns, and spreads only among a dense population, in an impure air.

3. When *bilious fever* prevails, it is caused by a *hot and moist* atmosphere, producing a degree of insalubrity extending over many miles of surface continuously, and without any circumscribed limits. *Yellow fever* prevails, or becomes epidemic in *hot and dry* seasons, and is restricted to certain limits, and to a local atmosphere as clearly defined as the bounds of a town or village, or the limits of one or more streets in a city; or one or more houses, or even to a single ship; while all the exterior air is perfectly salubrious, and the country population is uncommonly healthy, being often exempt from any general disease.

4. *Bilious fever* exists in all grades, from the simplest remittent to malignant bilious fever, terminating fatally, and yet preserves its distinct character, never assuming any of the pathognomic symptoms of yellow fever. *Yellow fever* in like manner exists in all grades from the mildest to the most malignant form, without losing its distinct and pathognomic character, whether it terminates in convalescence or death.

5. Persons who are natives of tropical climates, or those who have become acclimated to yellow-fever malaria, or who have recovered from one attack, are mostly exempt from a subsequent attack of yellow fever, but may have repeated attacks of bilious fever. Those who have been subjected to frequent, or annual attacks of *bilious fever*, are more liable to subsequent attacks, than those who have never suffered from it; and they are equally as obnoxious to epidemic yellow fever, as those who have never had bilious fever.

6. *Bilious fever* occurs in an atmosphere but slightly, if at all, contaminated by respiration; yellow fever, as an epidemic, depends for its existence upon air contaminated by human respiration.

Observant practitioners of the South, who have been familiar with yellow fever and also with bilious fever, do not pretend to identify the two forms of disease. They know by

experience and repeated observation, that they are essentially different forms of disease; that yellow fever is a disease *sui generis*; and that yellow fever and bilious fever do not prevail in the same local atmosphere. When bilious fever prevails generally in the surrounding country, the cities have no cause to apprehend epidemic yellow fever.

In this I am sustained by the testimony of all southern experience untrammelled by theory. The venerable Dr. Samuel Hogg, of Nashville, who practiced several years in Natchez, has assured me repeatedly of his firm conviction, that yellow fever is a specific disease, and partakes no more of the character of bilious fever, than of any other form of disease. In relation to the epidemic of 1837 in Natchez, he thus expresses himself in the *Western Journal of Medicine and Surgery*:\*—"It was not, as has been supposed, a high or malignant grade of bilious fever; the whole surrounding country being more exempt from that disease than usual." . . . . "Also in most cases of recovery, the first satisfactory evidence of amendment, was a plentiful secretion of dark acrid bile."

After showing that it differed from all the ordinary diseases of the country, he remarks:—"If it were neither of the foregoing diseases, the question arises, *What was it?* I must briefly answer, that it was an assemblage of symptoms, or rational signs, indicating the modified condition of such organs as previous predisposing causes might have made obnoxious to the morbid influence of a specific cause, not cognizable to our senses—a poison *sui generis*, infecting a certain atmosphere."

On the 20th of October, 1839, the writer had an interview with the same distinguished individual, who had just returned from Nashville, by land, and through the interior of Mississippi, from north to south. The Doctor declared that in his route, he had passed leisurely through the whole length of the State, visiting most of the towns and villages on the way; and that while he daily heard of the ravages of yellow fever in

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\* See June No. for 1840—Hogg on the epidemic fevers of Natchez.

most of the cities and towns in the southwestern portion of the State, he was astonished to find so universal an exemption from disease of every kind, in the interior; and that he had not seen or heard of a case of bilious fever in the whole route. He then declared that the evidence was conclusive, that yellow fever and bilious fever were two separate and distinct diseases. He expressed his belief, that no discriminating observer, who had witnessed the facts of this summer, would contend otherwise; for the case presented by the summer and autumn of 1839, would amply convince any man of sound judgment. The writer has witnessed the same thing several times in the lapse of twenty years. From the experience of twenty years' practice in the vicinity of Natchez, I have learnt that a hot and dry season during the summer months is a certain guaranty of health; a hot and wet season is a sure concomitant of sickness, and especially of bilious and congestive fevers. As a general rule it is known proverbially to be healthy in the country while yellow fever is raging in the cities and river towns. The inference is conclusive, that ordinary bilious and remittent fevers originate from causes, and under circumstances, entirely different from those which lead on yellow fever in the cities. So far as analogical reasoning can convince, these facts prove clearly that yellow fever is a disease *sui generis*; besides which we see that the symptoms, the accession, the course, the duration, and the termination, are all different in the two diseases. The organs and tissues mainly implicated are different.

Yellow fever is properly a disease of tropical climates. Like some tropical plants it may be transported to a more northern climate, and for a time may flourish; but the frost of our winters will utterly destroy it, and it must be annually renewed. Without this annual transplanting or renewal, in our climate it would die and become extinct. But the constant commercial intercourse with the tropical ports, serves to keep up the annual supply of this exotic. It can be successfully transplanted in our climate, only for a short time, when the weather in certain sections of the country is strongly

assimilated to the climate of the West Indies—such as in the island of Curacoa.

To establish the diversity between yellow fever and bilious fever, I am extremely happy to be able to cite the authority of Professor Caldwell,\* one of the most distinguished teachers of medicine in the United States. He supposes the poison of yellow fever may be constituted of different proportions of the same elementary principles, which enter into the morbid miasm of bilious fever; but that the proportions of these constituents are so varied, that the poison resulting is entirely different in its effects upon the human system. He remarks, that, “wherever genuine yellow fever reigns as an epidemic, it reigns alone.” Speaking of the peculiar nature of yellow fever, he continues: “Throughout the whole range its type is the same. It continues to be every where yellow fever; although in different places of very different grades. Under its lightest and simplest modification it is less severe, and more easily cured, than intermitting fever. Yet in type and character it is as different from that disease now, as when marked by its highest grade of malignity. Its strength and power to injure are gone; but in its form it has suffered no mutation.”

In illustration of the diversity of the diseases, I will state the following fact which fell under my notice. A friend of mine had fifteen negro slaves in New Orleans, where they had become thoroughly acclimated to yellow fever infection, and were exempt from its attacks during several epidemics in the city. In the spring of 1835, he removed them to a plantation on the Mississippi river a few miles above Natchez, and about 300 miles above New Orleans. During the following summer bilious fever prevailed to a considerable extent through the country, the weather being hot and showery. During the season every one of these negroes had severe attacks of bilious fever, in its severest grade, and one of them died from it who had been raised in New Orleans, and was not liable to yellow

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\* Medical and Physiological Memoirs—Prize Questions, pp. 210—211, &c.



fever. The others were removed to New Orleans in 1838, and remained there during the most malignant epidemic of 1839, in the most perfect health. This principle might be illustrated in a hundred cases. But it appears to me unnecessary to enter further into a discussion of the question whether yellow fever be a disease *sui generis*, or only a high grade of bilious fever.

I have been told by enlightened physicians and teachers of medicine in the region of the Ohio, that the two diseases are identical; that the bilious fevers on the Ohio frequently run into the yellow-fever grade; and that they have seen genuine yellow fever in the Ohio valley, of local origin. I do not hesitate to declare it as my opinion, that they are altogether mistaken on that point. A very strong argument in my favor is the fact, that scarcely a year passes without many young physicians emigrating to the south, as fully imbued with those doctrines as their learned teachers could desire; and they never do recognize yellow fever when they first meet with it; and almost invariably it is a source of much mortification to them afterwards. The older practitioners who are familiar with it, recognize it at once, and in any stage; those who have never seen it, but who are confident of their judgment, almost invariably deny the existence of yellow fever until it has made havoc among their patients and derided their skill. The medical faculty of Vicksburg in 1841, denied the existence of yellow fever in their city for two weeks after it was sweeping them off at the rate of 8 or 10 a day. This was the case too after several of them, unconsciously, had seen cases in the fall of 1839. In both cases it was called congestive fever. Our most eminent physicians, on their first introduction to the disease, were placed in the same unpleasant predicament. An intelligent physician of Vicksburg, informed me in December 1841, that for two weeks they had no suspicion of yellow fever, and considered the epidemic as some new form of congestive fever; and of course the treatment was not such as it would have been under a certain knowledge of its true character.

Along with the few advantages which have resulted from the dissemination of the doctrines of Dr. Rush, relative to the local origin of yellow fever, it must be admitted that several important evils have come. Of these, not the least is the utter disregard of many prudential measures, calculated to prevent the spread of the pestilence, as well as its introduction into our sea-ports. His doctrines inculcate an imprudent exposure of the healthy to the sources of disease, to infected atmosphere; and thereby to unnecessarily endanger the lives of our citizens, and the prosperity of our most flourishing cities. This exposure is inculcated under a vague conception of the terms, contagion and infection, at least, by those who are thus induced to become its victims. Relying upon some indefinite meaning of the terms, and utterly ignorant of the true laws which govern the origin and spread of yellow fever in the south-west, many enterprising and generous young men from the north, have been annually sacrificed to the prejudices of education. Hundreds every year fall victims, who, under proper views of this disease, might pursue the path of safety.

#### EPIDEMIC YELLOW FEVER AS IT PREVAILED IN THE SOUTH-WEST IN THE SUMMER AND AUTUMN OF 1839.

As the summer and autumn of 1839 must constitute a memorable epoch in the history of this pestilence, not only in the West Indies but also in the southern portion of the United States, we propose to give a general sketch of the season, as well as of some other circumstances which have contributed much towards its unusual prevalence in this portion of our country. We believe that yellow fever never has prevailed epidemically, at the same time, in so many seaports and inland trading towns of the United States, as it did in the summer of 1839. Scarcely a southern port or trading town, having direct commercial intercourse with the infected ports of the West Indies, or Mexico, escaped a visitation of epidemic

yellow fever, more or less severe; and almost every inland town, having direct and unrestricted commercial intercourse with the *ports*, after they became infected, became successively infected also.

The first appearance of this disease in the United States, during this summer, was invariably in the maritime or commercial ports; and the first cases were invariably among the shipping in port, and especially among those which were direct from infected West India or Mexican ports. In every instance the disease for several weeks was confined exclusively to the shipping, before it began to spread among the resident population. This fact is abundantly established by the concurrent statements of the public press in all the infected ports. In no port of the United States was a single case of yellow fever seen, even on board the vessels, until after it had been prevailing with great mortality for several weeks in the West India and Mexican ports.

The yellow fever began to rage in the port of Havana and Vera Cruz, early in the month of May: other ports became likewise infected nearly about the same time, such as Matanzas, St. Jago and others. The disease in all these ports had become epidemic before the 1st of June. In Havana it had become epidemic on the 24th of May, and on the 28th of May several American captains and seamen had died of it in the port of Havana.\* During the month of June it raged with unusual fatality, and the interments at that port for that month were 488.

It was late in August when the yellow fever began to decline; the Havana papers of August 10th state, that "the yellow fever is still very bad among the shipping." Ten days later, they state that "the sickness among the strangers has almost subsided for want of subjects."† "At Vera Cruz, it continued to rage with unabated violence," until the 16th day of October, "when there were more than 400 cases in the hospital."‡

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\*N. O. Bulletin. †Idem, Aug. 10th and following. ‡Idem for Sept. & Oct.

In Charleston S. C. yellow fever cases were known to be among the shipping from the West Indies early in June. On the 7th of June, Dr. Strobel, the port-physician, reported three cases of yellow fever on board the brig *Burmah*, five days from Havana. Two of them died the next day.\* On the 10th, other cases were reported on board other vessels; on the 12th the *Briganza* arrived from Havana with several yellow fever cases on board. Other vessels continued to arrive at Charleston with other cases on board until the first week in July, when it began to spread rapidly among the vessels and produced much alarm. During the whole of this time the resident population was perfectly healthy, until about the 10th of July, when the disease began to spread among the people near the wharves; and in ten days afterwards it began to prevail over other parts of the city.

About this time a vessel from Havana with yellow fever on board arrived at the quarantine ground in New York. The vessel was not permitted to enter the port; and no disease was communicated to the residents of the city. A few days afterwards an infected vessel from Havana, arrived in Portland, Maine, after losing several of her crew on the voyage. Several deaths by yellow fever soon after occurred in that place in persons who had been on board this vessel while at the Portland wharf.†

In *New Orleans* vessels from Havana arrived almost daily during the season. About the last of June, several cases of yellow fever had occurred among the shipping from the West Indies. Towards the close of July cases of yellow fever among the shipping were more frequent, and by the 1st of August about 25 cases had been received into the Charity Hospital. The cases among the shipping increased rapidly in the first ten days of August, during which time the disease was gradually insinuating itself among the resident population, contiguous to the wharves and shipping. On the 12th it

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\*See his report—*Charleston Mercury*. †See *Eastern Argus*, Portland—also the *Bulletin* for July 26th, 1839.



was admitted to be epidemic in the city. From the first of August up to this time the number of admissions into the hospital varied from 8 to 15 daily.

Mobile, Savannah, and other ports trading with the West Indies, were successively infected in the order of their commercial importance; while not a single *inland* town was infected, or was known to contain a case of yellow fever, from New York to Louisiana. The whole interior country, including towns and villages, was remarkably healthy, and exempt from all the ordinary bilious diseases of the season. In no inland town did yellow fever make its appearance either in sporadic cases, or as an epidemic, until at least ten days after it had been epidemic in the nearest commercial port; and the order of its appearance in the towns on the Mississippi, was exactly in proportion to the amount of direct communication by steamboats, with New Orleans, after yellow fever was epidemic in that city. The same was true of the small towns around the northern shore of the Gulf of Mexico, from St. Joseph's and Tampa Bay to the Teche, and even to Galveston in Texas. The town of Augusta, in Georgia, in like manner became infected after the yellow fever became epidemic in Charleston and Savannah.

As we progress, we propose to trace the connection between the disease in the maritime ports and the West India ports; as well as between the disease in the former, and the interior towns dependent on them for commercial supplies.

Although we do not propose to throw much light upon the treatment of this intractable disease—this West India pestilence, which, in its worst form, derides the skill of the whole medical faculty, and all the discoveries of science; yet we propose to do what is far better. We propose to point out prudential measures and precautions, which will more effectually protect our commercial ports from the ravages of this disease, than all the improvements which have been introduced into the healing art for ages past;—the one to excel the other, as far as prevention excels cure.

Independently of any extrinsic cause, such as *imported in-*

*fection*, there was, during the summer of 1839, "a general atmospheric predisposition," operating over a wide extent of country, and which prepared the local atmosphere of towns and cities for the easy dissemination of yellow fever as an epidemic. This atmospheric predisposition is nothing more nor less than the "epidemic constitution" of Professor Caldwell of the Louisville Institute. This condition of the atmosphere does exist, as he very properly contends. The peculiarity of this constitution we shall endeavor to illustrate. It is that condition of the air, which appears to be peculiarly adapted to the production of yellow fever infection—a condition which exists sometimes from June to August in the middle and northern States, and from July to October in the southern states. It exists, in all probability, only at the times and places above designated; because there is no instance on record where yellow fever *assumed* its epidemic character in the United States, north of lat  $40^{\circ}$ , after August or before June; or in which it first assumed that character, south of  $35^{\circ}$ , before July or after the month of October.

This peculiarity, as we have already shown at large, consists, as we suppose, chiefly in a continued, hot, calm, and sultry condition of the general atmosphere; at which time, the air of cities and towns, being more confined than the common country air, and being respired by thousands of persons constantly for many days together, becomes thoroughly charged or contaminated by the effluvia thrown off by a population of healthy human beings. This condition of the local atmosphere adapts it to the dissemination of yellow-fever infection; and when a sufficient quantity of infected air from an infected town or city, is introduced into this local atmosphere, it assimilates the whole of the contaminated atmosphere, and thus infects a portion of a town or city. Several patients laboring under yellow fever, confined in a circumscribed portion of this air, at a high summer temperature, for several days, will impart to that portion of the local atmosphere certain properties, which will cause it, after being secluded from ventilation

for a few days longer, to assume the properties of the most virulent yellow-fever infection.

Upon these principles we think it demonstrable that yellow fever has been repeatedly, and may be again introduced from infected towns, into those which were previously perfectly healthy; and, consequently, that suitable precautions at the proper time may and will prevent a recurrence of such epidemic.

The state of the *weather* during the whole summer of 1839 was *extraordinary*, in all the southern portion of the United States. Even the month of April was uncommonly hot and dry. The same condition of the atmosphere continued to exist during the succeeding months of May, June, and July, with a few light and transient showers, the latter only south of lat.  $31^{\circ}$  in the lower valley of the Mississippi. From  $31^{\circ}$  to  $34^{\circ}$  north, the drought was excessive from May until late in October. The mercury in Fahrenheit ranged between  $85^{\circ}$  and  $95^{\circ}$  in the shade for about three hours after meridian; and at the coldest part of the nights between  $75^{\circ}$  and  $80^{\circ}$ . In towns and cities the reflected and radiated heat would increase the extreme temperature to  $88^{\circ}$  and  $96^{\circ}$  by day, and  $78^{\circ}$  to  $83^{\circ}$  by night. In the latitude of New Orleans, and within 50 miles of the Gulf of Mexico, the seabreeze reduced the temperature two or three degrees, as we ascertained by comparing Dr. Tooley's tables with those kept in the Charity hospital in New Orleans.

After the 10th of August the weather became still more dry and calm: showers ceased to refresh the air, even for a few minutes. The whole region between lat.  $30^{\circ}$  and  $36^{\circ}$  was literally parched with drought. Before the last of August the surface of the earth, to the depth of several feet, had become entirely deprived of all ordinary moisture; vegetation began to droop; creeks and small water-courses became entirely dry, or lower than they had been for many years; the cotton plant began to shed its leaves and forms; many forest trees likewise began to shed their leaves. The same condition of weather continued through the months of September and Octo-

ber: the earth was parched; grass, and small vegetation entirely withered and died, under the burning sun; the earth thrown up from the bottom of cistern-pits 14 feet deep, was as dry as dust; wells 60 feet deep, which had never been known to fail, became entirely dry; the cotton plant, in thin uplands, was as completely stript of leaves as if a killing frost had passed over it; the atmosphere continued hazy and smoky for nearly two months; many of the forest trees had shed half their leaves a month before frost; exhaustion and fatigue followed the most moderate exercise in man or beast; the sun beamed down intensely without the intervention of a cloud; large tracts of trees in Opelousas swamps entirely died.

During the months of September and October, the general atmosphere was unusually *calm* and *sultry*; not a breeze moved the stillness of the forest, by day or by night; the morning dews ceased to appear; the stars at night shone with peculiar brilliancy and twinkling. For weeks after the general air was agitated by gentle breezes, the smoke still lingered in the vallies.

This state of the weather existed from the northern limit of Georgia to the western part of Texas, through a zone of six degrees of latitude at least.

The following meteorological synopsis is made from the tables of Dr. Tooley of Natchez:

*June.*—This was one of the hottest months ever known in Natchez: extreme temperature in the shade from  $90^{\circ}$  to  $96^{\circ}$  for 21 days; intense unclouded sun; little or no wind, and only three or four light showers;—average temperature at 6 A. M., was  $75^{\circ}$ ; at 12 M.,  $84^{\circ}$ , and at 6 P. M.,  $88\frac{1}{2}$ ; lowest point during nights from  $70^{\circ}$  to  $80^{\circ}$ .

*July.*—This month presented only a continuation of the same temperature, and general condition of the air.

*August.*—Same general state of weather; innumerable white cumulus clouds; intense sun; one light shower; no wind; average extreme temperature in shade, at 4 P. M.,  $88^{\circ}$  to  $90^{\circ}$ , and for eight or ten days the mercury ranged from  $90^{\circ}$  to  $94^{\circ}$ —nights warm and sultry—not one breeze; last 15 nights between  $65^{\circ}$  and  $70^{\circ}$ .



*September.*—Temperature nearly the same, but more calm and sultry; air oppressive for violent exercise, hazy and smoky; three light showers; average extreme temperature by day  $85^{\circ}$  to  $90^{\circ}$ ; lowest average temperature at night from  $70^{\circ}$  to  $75^{\circ}$ ; no wind.

The following synopsis is taken from the meteorological tables kept in the Charity hospital at New Orleans, where the reflected heat of the city exerts but little influence.

*June.*—Every day is noted as calm; only two light showers; four days are noted as cloudy; for the last 20 days the mercury ranged at noon from  $80^{\circ}$  to  $86^{\circ}$

*July.*—First 20 days were moderately warm—extreme height of mercury ranging from  $80^{\circ}$  to  $88^{\circ}$ , at noon; during the last 10 days mercury ranged up between  $82^{\circ}$  and  $88^{\circ}$ ; 23 days are noted as calm, and 10 of these as *foggy*; four days are noted cloudy with light showers; moderate wind on 6 days.

*August.*—This whole month was *calm*, *dry*, and *foggy*; every day is noted calm; yet at some hour of the day, before the 12th, there was some wind every day, with transient showers; on six days the mercury ranged as high as  $90^{\circ}$ ; near the wharves it would have been  $93^{\circ}$  or  $94^{\circ}$ .

*September.*—This month is much as the last—calm, dry, and foggy; every day noted *calm*, 30 days; two light showers; breeze one day.

*October* continued the same, until the 10th, when a strong wind or gale swept along the coast south of lat.  $31^{\circ}$ .

Such was the general “atmospheric predisposition” to epidemic yellow-fever; and notwithstanding this strong “epidemic constitution,” throughout all the south, the whole country, up to the actual introduction of yellow fever cases from the West Indies, was *more healthy than usual* at any season. Not a case of yellow fever was known either in town or country, until it had been prevailing to an alarming extent among the shipping in Charleston, New Orleans, Mobile, Savannah and other ports trading with the West Indies. Not the semblance of disease was seen in any point, until the “*seminarium*” and

the "*leaven of infection*" was introduced into a few principal trading maritime ports. Several weeks after these ports became infected, other towns became infected from them, as they had been from the West Indies.

The doctrine which distils a peculiar yellow-fever miasm from marshes, from putrescent animal or vegetable matters, from noisome vapors and noxious odors, exhaled from the surface of the earth, or from any combination of either of these supposed causes, must yield to the facts presented by the whole season of 1839, and by all the epidemics which appeared south of lat. 34°; for in no one instance did the concomitant circumstances accord with the prominent postulates of those theories. The general circumstances of the summer of 1839 are sufficient, we confidently believe, when duly considered by our most eminent medical men, to convince them that the doctrine of the domestic origin of yellow fever in the United States, is entirely unfounded in fact, and utterly confuted by all the facts presented in this epidemic prevalence of yellow fever; the facts themselves, if investigated, demolish the doctrine. Some of these we will notice as we progress.

In our examination of the facts, and in the arguments and legitimate deductions which we shall draw from them, we ask of our professional brethren a calm, patient, and impartial consideration. Our object is not to sustain a favorite theory, but to present the facts as they really exist, and to set them forth in their *true light*, so that those medical men, who, by a residence remote from yellow-fever regions, are precluded from personal observation, may have a fair opportunity to examine for themselves, whether the *whole matter has not been misrepresented* to them by most persons who have attempted to treat upon the cause of this pestilence in the United States. We know and readily admit, that the early doctrines instilled by our venerated professors, when we are upon the threshold of the temple of science, adhere to us with all the pertinacity and prejudice with which we would defend the religion of our fathers, right or wrong. Thus with the doctrine of local origin; having by a most unfortunate influence been adopted,

it is with great difficulty that any thing having an opposite tendency can have a reluctant examination. We do sincerely believe, that in relation to yellow fever in the United States, the medical faculty have had the subject presented to them in an *erroneous light*; and of no epidemics, more than those of Natchez. In the collection of facts relative to the introduction of the yellow fever into the southern ports and towns, we have derived our information from persons of intelligence and discrimination.

The great point to which all our facts and arguments tend, is to show that *yellow fever is a tropical disease*, peculiar to a few *tropical West India ports*; whence it is occasionally *imported*, in some form or other, into our maritime ports; and that from them it is subsequently *transported to other ports*; that it is a *commercial exotic*, temporarily transplanted upon our soil, *but not indigenous*.

It has been witnessed repeatedly, that during the strongest "epidemic constitution" as it is called, there has been no yellow fever in the United States, unless it has been prevailing to an alarming extent in Havana or some of the West India ports for many days previously. This has been exemplified repeatedly in Charleston, Mobile, and New Orleans. The same principle is confirmed at Natchez, which never has been visited with yellow fever, until *after many cases had been introduced from New Orleans*. Indeed as before remarked, this general hot, dry, and sultry condition of the air in the south is a *certain and infallible* indication of a healthy population—exclusive of imported infection.

We desire it to be remembered, that we do *not* advocate the *absolute and unconditional contagion*, or infection of yellow fever, and that it has the property of communicating itself from one individual to another, in a pure and free atmosphere; very far from it. But we do contend, that, under certain circumstances, independently of all local accumulations of city filth, the local atmosphere of towns or cities becomes so contaminated by a healthy population, that it becomes peculiarly adapted to the dissemination and spread of yellow fever, when

a portion of infected air is introduced. At some times a moderate quantity introduced will produce this effect; at other times, when the atmosphere is less prepared, a larger quantity is requisite.

We cannot admit, besides the general "epidemic constitution," which *rests equally over town and country*, that a mysterious *tothion* rests over a certain number of doomed points, while all others are exempt from this peculiar influence. In periods of epidemic visitation we find those towns only specially exempt, which by nature are cut off from direct intercourse with infected ports. This principle was exemplified in a most remarkable manner in the summer of 1839, in the lower regions of the Mississippi.

The pure atmosphere of maritime ports, such as New Orleans, Mobile, Charleston, and St. Augustine, is generally such, that yellow fever, when it is introduced, and becomes epidemic, is always far less malignant and fatal, than it is in inland towns, beyond the influence of the sea-breeze. Hence the disease in Natchez, Vicksburg, and Augusta, is more fatal than in the cities on the seaboard. On the same principle, it requires a much greater amount of imported infection, to bring on an epidemic in these cities than in the inland towns; hence the disease will prevail for weeks among the shipping in port, before it spreads among the resident population: but in the interior towns three or four infected steamboats, or a dozen yellow fever cases introduced, within ten days, with their bedding and cloths, will generally produce a sudden out-break of yellow fever as an epidemic. Besides, we always find that the epidemic ceases, in the maritime ports, sooner, and with a less degree of cold, than what is necessary to destroy the infection in inland towns; and in New Orleans and other maritime ports, the proportion of recoveries is much greater than in the inland towns, a large proportion of the cases being comparatively of a milder grade. The atmosphere of *interior towns becomes more contaminated*, and more stagnant, and produces a *more malignant grade of disease*, than the purer air near the seaboard.



In further tracing the origin and spread of yellow fever during the summer of 1839, we will first speak of its appearance and prevalence in NEW ORLEANS, and its extension from that city into the lower valley of the Mississippi.

We have already made reference to the fact that yellow fever cases were seen among the shipping in this port, as early as the month of June; and that cases continued to appear among the vessels during the whole of July and until the 12th of August, when it was spreading among the resident population near the wharves. On the 15th of August it was admitted to be epidemic in the city, and strangers were advised by the public authorities to leave the city. The disease spread with great violence over a large portion of the city, near the wharves. Cases multiplied rapidly. A number appeared near the canal basin, among the sailors, draymen, and laborers. Near the river wharves, where the principal shipping lay, the first victims were draymen, clerks, merchants, laborers, and others who were daily in the vicinity, or on board of infected vessels. The Charity hospital became crowded from the first of August until the close of the epidemic. The number of cases admitted into the hospital were as follows: viz., in August, 507; September, 361; October, 110; November, 87.

¶The report of cases in the Charity hospital is considered a good criterion of the prevalence of the disease, and is published for the information of the citizens. The greater part of the admissions into this institution, consists of seamen, foreigners, and destitute poor, who comprise two thirds of all the cases of fever in the city during the first month of its prevalence.

So soon as these reports corroborate the general impression of alarm, at the spread of the disease, all those who are able and willing, leave the city and seek some retreat among their friends in different towns in Louisiana and Mississippi, within 300 or 400 miles of New Orleans; some retire to the Bays of St. Louis and Biloxi, east of the city; some to the settlements on the Teche, Lafouche, in Oppelousas, and in the towns along the Mississippi as far as Natchez and Vicksburg.

The number of persons of all kinds who leave New Orleans suddenly, or within fifteen or twenty days after yellow fever is announced as epidemic, is seldom less than ten or fifteen thousand, and often not short of twenty thousand souls. Every steamboat is crowded; and every town on the river receives its proportion. Among them are great numbers of Irish and German emigrants, fresh from Europe, many of whom seek employment in the towns above.

As to the *cause* of the epidemic in *New Orleans*, we have already admitted a general "epidemic constitution of the air," such as prevailed over all the southern part of the United States and Texas. But this alone did not produce the disease in this city. Notwithstanding the frequent cases of yellow fever which had appeared among the shipping, as early as the last of June, and the great increase of those cases, during the whole month of July, the *population of the city*, resident and transient, never was more healthy *at any season of the year*. This fact gave assurance of an exemption from an epidemic to those who believe in the local causes to which yellow fever has often been erroneously traced. The public press congratulated the city upon the favorable prospects, and the *absence of local causes of disease*.\* On the 10th of August a change was admitted by the press, and on the 12th the existence of yellow fever as an epidemic was publicly avowed, and strangers were advised to leave the city.†

By a reference to the port-register of New Orleans it will be seen, that, during the month of July and the first ten days of August, in 1839, *more than twenty-five vessels* arrived in port from Havana, Vera Cruz and other infected West India ports. Most of these were small, such as brigs and schooners, and had left Havana and other ports after the 23d of June, the very time when yellow fever was most malignant in those ports.

We do not intend minutely to trace the introduction of yellow fever into New Orleans, but only to make a few general remarks on the subject of its introduction. It cannot be con-

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\*N. O. Bulletin, from Aug. 1st to 7th, 1839. †Bulletin, Aug. 12th.

tended by any one, certainly, that filth and such matters gave rise to this epidemic; for during the first week in August, as well as previously, the press was boasting, and justly too, of the unusual cleanliness of the city. Only a few days before the disease spread from the shipping to the resident population, the daily newspapers confidently predicted an exemption from disease, because of the absence of its usual sources, which they erroneously supposed to be putrescent matters about the wharves, and city filth. Another criterion upon which the prediction was based, was the extraordinary state of the health of the city generally.

But a few days showed the fallacy of that theory which attempts to trace epidemic yellow fever to city filth and other local causes. The disease which had been confined chiefly to the shipping, suddenly enlarged the sphere of its action, after a few days of hot, *calm and sultry* weather after the first of August.

We believe that independent of imported infection and cases of yellow fever, New Orleans is naturally as exempt from yellow-fever epidemics as any other port in the United States.

Yet when this city does become strongly infected, it becomes a source from which many other towns and cities on the lower Mississippi are liable to become likewise infected. If in our progress we give any good reasons to convince the reader that yellow fever may be, and has been transported from New Orleans to inland towns, we hope the converse of it may be admitted as true, viz:—that it may possibly have been imported into New Orleans.

We will pass on to the extension of the disease to many towns and villages on the Mississippi, and in the interior of Louisiana, during the summer and autumn of 1839. We think the facts will justify the inference, that in every instance where yellow fever appeared among the population of any of these towns, it was *the result of unrestricted intercourse with New Orleans*, after that city became strongly infected. The intercourse by means of which this disease was introduced

into the interior towns, is carried on chiefly through the agency of steamboats, which have been the principal means of extending that disease on the Mississippi above New Orleans.

During the summer and autumn of 1839, many of the towns and villages on the river within 400 miles of New Orleans, and also some towns on other streams in Louisiana, were visited by yellow fever within 20 or 30 days after it became epidemic in the city. In every instance where this occurred, the *first cases* of the disease were invariably traced to New Orleans; and *only such towns* as had free intercourse with the city by steamboat, were visited by the disease. Those towns which were cut off from such intercourse by nature or circumstances, invariably escaped the epidemic, although they might have double the population of others, and might be only half the direct distance from the city. The first individual cases, in any of these towns, were either persons landed from steamboats with the disease openly developed in their systems, or persons who had recently left New Orleans with the infection dormant in their systems when they landed, but which soon after was developed in its most malignant form.

The order in which the interior towns became infected, was that of the extent of their commerce and the frequency of steamboat intercourse with the city of New Orleans. Not a single town or village presented a case of yellow fever until 15 or 25 days after it had been fearfully epidemic in New Orleans. Yet all these inland towns had been exposed to the same "epidemic constitution" of the atmosphere, and even in a much higher degree, as we have already shown in our remarks on the weather. If some foreign agent or influence were not necessary, why did the epidemic visit New Orleans one month earlier than Natchez or Vicksburg?

Again we repeat that in no instance did a case of yellow fever occur, as a harbinger of an epidemic, in any of the interior towns, unless such case was clearly traceable to New Orleans infection. In every instance too, the disease began to spread first about the wharves and steamboat landings. Examine a map of Louisiana and Mississippi closely, and no one



town can be pointed out which was entirely cut off from communication with New Orleans, and which had any cases of yellow fever; even towns on tributary streams, which carry on a large commerce with the city in spring seasons, but which were cut off by low water in August and September, were as free from yellow fever as those which never had any such intercourse. On the other hand, *every town and village* on the Mississippi, and in the interior, within 300 or 400 miles, which had unrestricted commercial intercourse with New Orleans after the 20th of August, suffered more or less from epidemic yellow fever.

As we have made frequent allusions to the agency of *steamboats* in spreading the disease on the lower Mississippi, it may be proper here to explain more particularly the manner in which this effect is produced.

The introduction of steamboats upon the Mississippi, has produced a new era in the commerce of this great valley. Formerly vessels from Havana and other ports, were often 10 and even 20 days in ascending the river to New Orleans, propelled by wind alone, against the strong current and the numerous bends of the river. Now they are towed from the Balize in less than 24 hours. But the greatest change has been effected in the commerce on the river *above* New Orleans.

Formerly the whole commerce down the river, was in flat-boats, or floating arks; but few boats, comparatively, *ascended* the river, and these were barges and keel-boats, propelled by hand, at the tardy rate of eight or ten miles a day, and often less. A barge would be 30 days from New Orleans to Natchez; and one barge did not leave the city for the towns above, where twenty steamboats do now. Of course the ascending commerce of the city is a hundred fold more than it was before the introduction of steamboats. Scarcely a day elapses without the arrival of from one to five boats, ascending direct from New Orleans; and they continue their trips during the prevalence of the epidemic. The packets in the lower trade continue their trips regularly all the year, and make regular

landings at all the important landing-points above New Orleans.

These boats, after lying at the wharves for several days each trip, in the midst of the infected air of New Orleans, when the epidemic is prevailing, and after receiving their freight from the infected district, besides probably half a dozen cases of yellow fever in the meantime, at length become badly infected, and the entire atmosphere, in confined portions of the boat, becomes as thoroughly infected as the air of the infected district itself. A boat may thus contain an infected atmosphere, which may infect one or more persons at each village or landing where she touches, provided they go on board and remain a few minutes. In this manner persons visiting a boat may contract yellow fever with as much certainty as if they had visited the infected district of a city for an equal length of time. A steamboat is a large moving tavern, and may become as much infected as any stationary tavern or hotel in a city; and those boats which remain at the wharves of New Orleans for five or six days, discharging and receiving freight from the infected district, after the epidemic assumes its most malignant character, are fortunate if they do not become infected by the first or middle of September. At every town and village where the boats make a landing, there are scores of persons of all descriptions, who immediately rush on board where they remain until the boat is about to leave. If one, out of every ten, contracts the disease, the continual arrivals will soon infect twenty or thirty persons, who will probably sicken at different periods, from three to eight days afterwards. These may reside in opposite parts of the town, and each may be traced erroneously to some contiguous collection of animal or vegetable matter. Twenty or twenty-five cases thus contracted, in a strongly contaminated atmosphere, may be sufficient to produce a sudden outbreak of epidemic yellow fever.

Without multiplying examples, we will adduce the case of the steamboat Corsair, which left New Orleans in September 1839, for St. Louis, having on board at least 50 passengers of

all kinds, besides her crew. Soon after her departure many of them began to sicken with yellow fever daily, and one or two died every day during her trip. Before she arrived at St. Louis, this boat had buried fifteen of her passengers and crew at different points along the river bank. Others recovered, and many were still sick when she arrived at St. Louis. Most of these persons, no doubt, contracted the disease in New Orleans; but such a number of cases was sufficient to infect the boat, especially after receiving her freight from the infected district. Had this boat continued to run in the lower trade, in all probability, before November, she would have been instrumental in spreading yellow fever in many towns on the lower Mississippi. This is not an extreme case by any means in this region; and it is beyond doubt true, that *yellow fever was unknown in the towns above New Orleans previous to the introduction of steamboats.*

After New Orleans had become strongly infected, and the epidemic had been prevailing fatally for about two weeks, the disease began to make its first appearance at various points on the river above; and even on Red River, and the bayous south and east of Opelousas. The points where it first appeared in this manner, were the towns and landing-places most intimately connected with New Orleans by steamboat navigation.

The following are the principal points on the Mississippi river above New Orleans; viz.

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|-------------------------------|----------------|
| 1. Donaldsonville,            | 5. Bayou-Sara, |
| 2. Plaquemines,               | 6. Fort-Adams, |
| 3. Port-Hudson,               | 7. Natchez,    |
| 4. Waterloo or Pointe Coupee, | 8. Vicksburg.  |

Besides those places immediately upon the banks of the Mississippi river, there were the following towns and villages on Red River and the bayous of lower Louisiana; viz.,

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|--------------------|----------------------|
| 1. Alexandria,     | 5. New Iberia,       |
| 2. Natchitoches,   | 6. Franklin,         |
| 3. Opelousas,      | 7. St. Martinsville, |
| 4. Thibodauxville. |                      |

The disease as it appeared in each of these towns, was clearly traced to New Orleans, for the first cases, during a week or ten days, and until it became epidemic, after having established a new centre of infection; which then produced an extension of the disease independent of any *additional importation*.

1. *Donaldsonville*. This town is situated on firm alluvial banks, on the west side of the Mississippi, and immediately below the efflux of the Lafourche, 85 miles above New Orleans. It is a beautiful and cleanly town, with a population of about 1000 souls. In high stages of the river, steamboats run regularly from New Orleans into the Lafourche, and to the whole settlement on that stream; but in low water, the outlet being dry, all freight and passengers for the Lafourche are landed at Donaldsonville; whence there is a short portage to the deep water in the bayou a mile or two below, where other boats receive them.

During the summer of 1839, Donaldsonville, like all other towns on the lower Mississippi, was remarkably healthy until the first of September, when yellow fever had been epidemic in New Orleans for more than two weeks. This state of health continued *uninterrupted*, until after ten or twelve cases of yellow fever had been introduced from New Orleans by the boats; besides a few persons who arrived from the city with the infection dormant in their systems, and soon after were attacked by fully developed yellow fever. These cases were all taken to the public hotel or to other houses in that vicinity, and near the steamboat landing. At length towards the middle of September, the local atmosphere was contaminated, or *infected*; and other persons, who had not been exposed to any other source of infection, contracted yellow fever and died, after having been more or less in the newly infected district. The remainder of the town continued healthy. Among the first persons attacked in Donaldsonville, after the first imported cases, were several persons who had visited, nursed, and sat up with the sick. The disease continued to spread slowly until frost, when about 30 deaths had



occurred besides the first imported cases. This statement is given upon the authority of Col. H. T. Williams, Surveyor General of Louisiana, and of Mrs. C. M. Thayer, both residents of that town. It will be remembered that Donaldsonville, during that period, was a regular depot for the trade of all the Lafourche country; and that passengers and freight were obliged to remain there from one to three days before reshipment. Not being a commercial town, it is destitute of wharves and other supposed sources of yellow-fever miasm.

2. *Plaquemines*. This is a small straggling village along the west bank of the river, just below the outlet of the Plaquemines bayou, 34 miles above the last. It contains a population of 25 or 30 families, besides a few stores and warehouses for the Plaquemine and Oppelousas trade. At low stages of the river it becomes a depot and carrying point for the trade; the outlet of the Plaquemines is dry at such times, and steamboats cannot pass through.

This village was entirely free from any disease until after several yellow fever patients had been landed by the boats from New Orleans; besides some few persons who sickened and died on their way to Oppelousas. A local air became infected; and the disease was thereby communicated to others who had not been exposed to any other source of infection. Twelve or fifteen persons died at this place of yellow fever.

We should have remarked before, that when any town becomes infected, or when a few cases of yellow fever make their appearance, the *mass of the inhabitants immediately desert the place*; and the cases which occur, as well as the deaths afterwards, are from among the remnant of population who decline leaving.

The next town on the river above is *Baton-Rouge*, on the east bank, upon high rolling ground, 140 miles above New Orleans, and 23 miles above Plaquemines. The population of this town is about 8 or 900. This is *not a trading town*, and no extensive settlements are near to make it a shipping point. The United States' Arsenal, State Penitentiary, and

other public buildings, give it all its importance. This town in 1839, like some others which we shall hereafter notice, *entirely escaped the epidemic yellow fever*, by a *quasi non-intercourse* with New Orleans, during the epidemic in that city. Besides the absence of a trading population, there is a shoal bar near the town, which prevents steamboats from landing in low-water; and further, the people, unbiassed by the interested policy of a *mercantile* community, and left to the deliberate convictions of their own judgments, refused to receive yellow-fever patients into their town. Their apprehensions had been thoroughly awakened to the danger of *imported* yellow fever, by an occurrence which was still fresh in the memories of many of them. I allude to the fact, that in the fatal autumn of 1829, a number of Spaniards, refugees from Mexico, had sought refuge from political dangers in New Orleans; but soon after their arrival, the yellow fever made its appearance in that city, and they were obliged to retire to a place of safety from disease. They took a steamboat for Baton-Rouge, after many of them had contracted the seeds of disease in the infected city. Soon after their arrival at Baton-Rouge, yellow fever made its appearance among them, and many of them perished. An infected atmosphere was generated, which communicated the disease to the resident population, among whom it prevailed with great mortality. For these facts I am indebted to D. P. Cain, Esq., of East Baton-Rouge parish.

This *non-intercourse*, and the *non-introduction* of yellow-fever patients into Baton-Rouge in 1839, is the only satisfactory reason *why this place escaped* during this fatal epidemic season; when every town and landing place below, and above, for 250 miles, with *uninterrupted intercourse*, were desolated by the pestilence.

3. *Port-Hudson*. This is a small village containing about 30 houses and 100 souls. It is situated on the east bank of the Mississippi, upon a firm clay bluff, about 35 feet above the river alluvion, and 25 miles above Baton-Rouge. It is the shipping point for an extensive back settlement, 25 or 30 miles distant. A rail-road from Jackson, La., intersects the

river at this point, which also contributes to render it an important steamboat landing. During the month of September, the yellow fever was introduced among the merchants, clerks, and laborers, and about fifteen of them died. Others from the country contracted the disease.

4. *Waterloo*. This is an important landing-place for the rich settlements on Fausse Riviere, of Pointe Coupee. It is five miles above Port-Hudson, and is situated on the west bank of the river. The commercial intercourse between this place and New Orleans was *uninterrupted*; and besides the usual steamboat communication, during the epidemic in the city, a number of the French inhabitants, believing they possessed a constitutional immunity against the disease, made a visit to New Orleans in the midst of the epidemic. After a few days of pleasure and dissipation in the city, they returned; and several of these were soon attacked with yellow fever and died. An infected atmosphere was generated, and several others, who were not exposed to any *other* source of infection, sickened and died. The whole number of deaths at this place was about 15. I derive this information from D. P. Cain, Esq.

5. *Bayou-Sara*. This is a very important shipping point, on the east bank of the Mississippi, about 6 miles above the last village. The East Feliciana rail-road terminates at this point. The principal town, St. Francisville, is nearly a mile from the river, on high rolling ground; while Bayou Sara is situated on the immediate bank of the river, and is properly the landing, or shipping point for the town, and an extensive settlement for 50 miles back.

When yellow fever became epidemic in New Orleans, many persons came to Bayou Sara, and the vicinity, as a retreat from disease; others arrived at intervals subsequently; and the regular packets, besides the boats in the upper trade, continued their trips as usual during the epidemic, until many cases of yellow fever were introduced, as at other points. An infected district was produced near the steamboat landing, and the disease finally spread among the resident population; it was

also communicated to some from the country, who had not been exposed to any other source of infection. About 20 persons died in this town and its vicinity. This place, as well as St. Francisville, was remarkably healthy until after cases of yellow fever were introduced from New Orleans.

6. *Fort-Adams*. This town is situated on the immediate bank of the river, on the east side, at the foot of a high hill or bluff, many of the houses being crowded up the side of the hill. It is 75 miles above Bayou-Sara; it is a town of considerable trade for the back country, and is a shipping point for steamboats. The population is about 300. The yellow fever was introduced into this town in the same way that it was introduced into Bayou Sara and other towns below. It assumed an epidemic form late in September, and about 20 deaths occurred before it was checked by frost.

7. *Natchez* is the next in order. This city is nearly 300 miles above New Orleans, on the east side of the river. It is situated chiefly upon high ground, nearly 200 feet above the river; a portion at the immediate landing for steamboats and flatboats, is at the base of the bluff, along a narrow strip of alluvium, about 50 yards wide, and 600 yards in length. This portion of the city contains about 50 or 60 houses, including several large warehouses, stores, and hotels, with a resident population of nearly 200. It has always been the point first infected with yellow-fever, with one exception, which is easily explained. The disease always makes its first appearance among the clerks, shop-keepers, laborers and others, who reside upon the wharves or frequent the steamboats during the summer season.

Before we proceed to speak further of the epidemic of 1839 in Natchez, we will take occasion here to remark, that the beautiful *village of Vidalia half a mile distant on the opposite side of the river, has never been known to be visited by yellow fever*, even when it has been raging fearfully in Natchez. It has always continued healthy although Natchez, on the opposite bank, was perfectly desolated by that disease. The situation, as regards local causes, is in no wise different from



Donaldsonville, Plaquemines, and Waterloo, except that Vidalia *is not* a trading town; steamboats are scarcely ever known to make a landing there. Natchez, immediately opposite, is the port; and Vidalia has no more intercourse direct with New Orleans by steamboat, than if it were ten miles from the river. Hence, we infer that *Vidalia owes its exemption solely to non-intercourse* with New Orleans by steamboats. Even in 1839, when the "epidemic constitution" of the atmosphere was universal in this latitude, Vidalia was perfectly healthy. Why this peculiar exemption? The only valid reason to be assigned is, that the *indispensable requisite* is absent—the *leaven of imported infection*, which is introduced by steamboats. Vidalia is in the midst of an extensive alluvion, and as much exposed to marsh miasm as New Orleans itself, and far more than Natchez.

In regard to the state of the weather at Natchez in 1839, we have already shown that it was excessively *warm, dry, and sultry*, with a smoky or hazy atmosphere. During the last 15 days of August, the mercury ranged as high as 90° and 91° each day, in the shade; and there was but little change from that during the whole month of September. Even the month of October was characterized by continued hot, sultry weather, with the mercury ranging almost as high.

*Natchez never was more healthy* than during the last 30 days preceding the epidemic of 1839. Without fear of contradiction, I might say there was no city in the United States, of the same population, more healthy than Natchez was, until after the introduction of yellow-fever cases, and constant steamboat intercourse with New Orleans for nearly 30 days after yellow fever had been epidemic in that city. The whole country was alike healthy; *not a case of bilious fever was known*; even the negroes who toiled in the sun, on the hills of Mississippi, and in the swamps of Louisiana, were alike free from the usual diseases of the season. At such a time as this, our citizens were daily exposed to imported infection, for nearly 30 days after yellow fever had been epidemic in New Orleans. During that time, scarcely a day elapsed,

without the arrival of one or more steamboats crowded with people returning to the north, besides scores of Irish and German emigrants direct from New Orleans with their bundles of filthy clothes and beds, and occasionally one or two open cases of yellow fever to be sent ashore to the hospital. More or less of these foreign emigrants were left by each ascending boat, and often with the seeds of disease dormant in their systems and ready to be developed in a few days in the midst of a healthy population; steaming infection from the close and crowded huts and cellars in which they were compelled to seek shelter. Before the 20th of September there had been twenty deaths in the hospital, chiefly from among this class, and from the sick taken off the boats. Besides these, there were several persons residing in Natchez who had imprudently visited New Orleans, and who were attacked soon after their return.

Such was the state of things in Natchez for more than three weeks before the epidemic broke forth in its fury. Under these circumstances, and with the daily importation of large quantities of blankets and woollen goods for the planters, all from the infected district of New Orleans, could any one reasonably expect *less than an epidemic yellow fever*? Southern people, who are unbiassed by interest, know too well the character and habits of this disease to plead ignorance on the subject. If, knowingly, they permit their better judgment to be influenced by a class of interested merchants, and suffer pestilence to be imported and spread among the helpless and innocent population, the innocent and the guilty must suffer together. But the municipal authorities must answer to God and their fellow citizens for the untimely deaths of hundreds of helpless poor, and many valuable citizens.

After many cases of yellow fever had been introduced and others had occurred, there seemed suddenly to be two principal centres of infection in the upper part of the city. These were the City Hotel, and the Railroad Hotel, both within fifty yards of the west end of Main street. The former was the resort of American strangers generally; the latter, in like man-

ner, was the resort of the German emigrants, of whom there were many in the city. Each of these hotels were more or less crowded with strangers, daily arriving from New Orleans.

Yet in these houses and vicinity, an infected air was not produced until late in September, after the disease had prevailed near the steamboat landing for nearly two weeks, and several persons had died at the hotels.

Here we would remind the reader that in 1837, the first principal focus or centre of infection in the upper city was a German tavern on the corner of State and Commerce streets, which at that time was the principal resort of the German strangers. This custom was transferred to the Railroad Hotel in 1839, when the former was discontinued. In 1839 that portion of the city near the corner of State and Commerce streets was almost exempt from the disease; while in 1837, there being no such house as the Railroad Hotel, that point was comparatively exempt from the disease.

It was not until the 22d of September, 1839, that the disease began to spread rapidly near the steamboat landing; immediately after which a large portion of the population fled to the surrounding country for protection, and by the 28th the population of the city was reduced to 800 or 900 souls. The epidemic raged with great malignity until the middle of November, when 235 persons had died, viz:—69 in September, 135 in October, and 31 in November. Three practising physicians died, and three recovered after the most severe attacks. The whole number of cases was about 500.

The advocates of its local origin from city filth and putrescent matters, or from decaying vegetables, or miasm, were compelled to abandon that ground as *untenable* in the present epidemic. The facts relative to the beginning and spread of this epidemic, made hundreds of proselytes to the doctrine of imported infection, which could never have been effected by human reasoning.

Such had been the reliance upon a cleanly condition of the city, as an infallible guarantee of health, and as security against an epidemic, that the municipal authorities, in accor-

dance with these views, had caused the whole city to be thoroughly cleansed and spread with lime as a preventive. So effectually had this been accomplished, that the advocates of the local origin confidently predicted an exemption from an epidemic visitation, and derided the very mention of the word *quarantine*. The malignant epidemic which soon after broke out, convinced them that *something besides city filth, and the like, could produce epidemic yellow fever*.

It may be inquired, why is Natchez so frequently visited by yellow fever, when Vicksburg and other towns above Natchez have frequently been exempt? The reason is clear and unequivocal to my mind. Natchez is about 300 miles above New Orleans, a run of 36 or 40 hours for ordinary boats. It is the first port of entry, and by far the most important commercial point between New Orleans and St. Louis. It is the only point in this whole distance where a public hospital is prepared for the reception of sick and indigent boatmen, and yellow-fever patients from the ascending boats. Scarcely a boat from New Orleans passes Natchez without making a landing, at all seasons, and especially during an incipient epidemic in New Orleans, to discharge the numerous passengers and emigrants flying from the disease, as well as to relieve themselves of the sick who may be on board, either among the cabin or deck passengers. Hence every boat ascending to St. Louis, or the Ohio, is sure to make the *first principal landing at Natchez*, and the packets frequently make it the termination of their upward trips. Every boat making such a landing at Natchez, has no occasion to stop again at Vicksburg, or the intermediate towns; because her principal passengers, not bound for the upper country, *as well as all her sick*, are discharged at Natchez. Before other cases of disease are developed, the boat is in a colder region, or far above Vicksburg. In such cases, it is common for the boats to stand out in the river, at Vicksburg, for a few minutes, until the yawl only is sent ashore.

Hence, when the hospital at Natchez, (*which is within the city*) is kept open for the reception of yellow fever patients,



it serves as a lure to attract infected boats to her wharves, and invite pestilence among her own citizens. This very policy often protects the towns above and below, while it exposes her own citizens to the horrors of a malignant epidemic.

The converse of this has been clearly proven in two epidemics—those of 1839 and 1841. In 1839, Vicksburg, the next important town above Natchez, continued free from yellow fever until after Natchez had become so thoroughly infected and desolate, by the 10th of October, that the upward-bound boats ceased to make landings there, and passed on to Vicksburg, 110 miles above, as their first principal landing above New Orleans. What was the result? *In fifteen days from that time, yellow fever was epidemic at Vicksburg*, in all the lower part of the city near the steamboat landing. Again, in 1841 Natchez closed her hospital and established a quarantine as soon as yellow fever was epidemic in New Orleans. What was the consequence? The first principal landing for upward-bound boats was at Vicksburg, which continued healthy up to that time, but was visited *with a most malignant epidemic* within twenty days after the Natchez quarantine was enforced; while Natchez, thus protected, continued perfectly healthy during the whole time the epidemic was raging on both sides of her.

Here I will cite another argument somewhat analogous, in relation to the protection of *Washington*, six miles east of Natchez. We have already, in the early part of these observations, spoken of the malignant epidemic which was introduced into Washington from Natchez in 1825. In 1839 all parties agree fully in the “epidemic constitution” of the general atmosphere on the lower Mississippi; this existed in Washington, no less than in Natchez. Such was the state of things when the people of Natchez fled at the first alarm of yellow fever in 1839. Washington was one of the principal retreats; and the town authorities, having the scenes of 1825 full in their minds, had watched with anxious solicitude the reckless policy of Natchez, and the gradual introduction of yellow fever into the city, and determined to protect their

own citizens. On the 15th of September, when the disease was making its gradual advances in Natchez near the wharves, the selectmen of Washington passed an ordinance *prohibiting the introduction* of all feather-beds, bedding, blankets, and other porous articles, from Natchez, after the 18th of September, believing that the disease would then be epidemic in that city. Yellow-fever patients were expressly prohibited from entering the town. The ordinance was rigidly enforced, and the whole town, with its crowded population, was entirely protected from the threatened pestilence, although about eight cases of disease developed itself in those who came out from Natchez apparently healthy. Every one in the slightest degree acquainted with the habits and approaches of this epidemic, were fully satisfied that it only required the *spark* to ignite the pestilential influence. At that time Dr. Samuel Hogg, formerly of Nashville, expressed to me his extreme fear that the crowded state of Washington would lead to an outbreak of yellow fever. But the whole population continued as healthy as usual, protected, as all admitted, by the "quarantine" as it was called. Those who had witnessed the epidemic of 1825, concurred in the opinion, that the general atmosphere in 1839 was better adapted to spread an epidemic than in 1825. In 1825 the intercourse with Natchez was *unrestricted*; daily supplies of goods, woollens and negro blankets, were received by the merchants. A malignant epidemic followed in 1825, and in 1839 all continued healthy.

8. *Vicksburg*. This is a port of entry on the east side of the Mississippi, about 400 miles above New Orleans. It is situated upon the side of a steep hill, or bluff upland, facing the river, and upon a strip of alluvion at the base of the bluff, about 50 yards wide, and half a mile in length. The latter is crowded with stores, warehouses, produce-stores, and numerous small shops, up to the immediate bank of the river, near the steamboat landing. The population is about 4000 souls.

This city, during the most fatal epidemics which have desolated Natchez, *has always been exempt until 1839*, when only a partial epidemic, which was checked by frost, had

commenced. The importance of Vicksburg, as a port and shipping point for steamboats, has been increasing for the last few years; and in 1839 the railroad leading to Jackson was put into operation. This at the time drew a great many Irish laborers to the place when the yellow fever drove them from Natchez; and since the completion of the railroad, the commercial as well as the travelling intercourse has been augmented.

In 1839 this city continued as healthy as any city in the south until about the 10th of October. At that time the lower part of the city, at the foot of the bluff, began to be very sickly, and several deaths occurred every day, until the last of the month, when there had been as many as seven deaths per day for a part of the time. None could deny that some malignant disease was daily sweeping off its victims; but as none of the medical faculty of Vicksburg, although equal as a body to any in the Union, had ever seen yellow fever, and did not apprehend any such thing, from the cleanly state of the city, they concurred generally in calling it *congestive fever*. It continued its ravages until checked by frost early in November. By that time, at least 50 persons of all kinds had fallen victims to it; of these deaths about 30 occurred in the vicinity of the steamboat landing and many others near the railroad depot, among the Irish shanties. In the latter place an infected atmosphere was generated, which communicated the disease to those who had not been otherwise exposed.

This disease was, most *unquestionably*, *yellow fever*. Its symptoms, general character, and issue, have been detailed to me, and places it, in my mind, beyond a doubt. Dr. Hicks, who practised in the midst of it, towards the last of October, assured me that it was genuine yellow fever, with genuine *black vomit*. This peculiar characteristic of the disease cannot be mistaken by any physician who has once seen and examined it. Since the close of the epidemic of 1841 in this city, I have conversed with several of the physicians of Vicksburg, who had become familiar with *yellow fever*, and they were free to admit, that the fever of 1839 was genuine yellow fever. Many cases of

yellow fever in the first stages assume such an insidious aspect, that our most discriminating *teachers of medicine*, who have not been familiar with it, would be greatly deceived in their diagnosis, and mortified in their prognosis. Even in the advanced stage, there are cases where one not familiar with it, would pronounce a patient *convalescent* when he was *moribund*.

The first cases of this disease at Vicksburg in 1839, were brought there by steamboats; some were cases openly developed, and others were persons with the seeds of disease in their systems, but apparently in perfect health. An infected atmosphere was created near the steamboat landing, and near the railroad depot, which was gradually extending itself when it was neutralised by frost.

It is a material circumstance in this epidemic, that the city was *unusually healthy* for nearly three weeks after the epidemic had been raging in Natchez, and the first cases were certainly imported. And, had they been imported early in September, the epidemic would have matured before frost, and would have swept off five times the number it did.

How was it in 1841? Natchez established a quarantine; all the boats, with their refugee emigrants, and *yellow-fever patients*, or those with the seeds of disease dormant in their systems, were carried on to Vicksburg, and soon they spread yellow fever *there*, as they *would have done*, and as they *had often done before*, in Natchez. In twenty days, or by the 20th of September, they succeeded in producing epidemic yellow fever in Vicksburg, and it raged with great malignity until the first of November. Hence the first regular epidemic in Vicksburg occurred while Natchez, protected by a quarantine, escaped entirely.

The same principle was exemplified and illustrated, in the case of other towns, and especially Grand Gulf. This town in 1839 permitted free intercourse with all ascending boats which chose to land, and freely admitted the sick, and others. The consequence was that there were about 20 deaths from yellow fever, and the disease was assuming an epidemic form,



by generating an infected atmosphere, just as it was arrested by frost. The appearance of these cases in Grand Gulf was simultaneous with those in Vicksburg, and occurred only after boats ceased to land at Natchez. But in 1841, the case was altered. The people of Grand Gulf, encouraged by the example of Natchez, prohibited intercourse with infected boats, and utterly refused to permit yellow-fever patients to be set ashore within the town. Several of the regular packets desired to send some of their crews or engineers ashore for medical aid; but it was resisted by the people. Only two cases of yellow fever occurred in Grand Gulf in 1841, and they were in persons who had arrived from New Orleans, apparently in perfect health, but with the infection dormant in their systems. Grand Gulf continued as healthy as any town on the river.

Our attention will be next called to a brief notice of the disease as it prevailed in the towns on Red River, and upon the bayous west of the Mississippi and south of Red River; and also, incidentally, to its appearance along the northern shore of the Gulf of Mexico, and in Charleston, S. C., and Augusta, Georgia.

9. *Alexandria.* This town is situated on the south bank of Red River, just below the rapids, and about 365 miles by the river from New Orleans, or a run of 48 hours by the steam packets. It is the head of steamboat navigation on the lower Red River, during low stages of water. The population generally amounts to about one thousand souls.

The health of this place had never been more uninterrupted in the summer season, than it was for three weeks after yellow fever had been epidemic in New Orleans. The regular steam packets made each their regular weekly trips to and from New Orleans. When the stage of the river admitted the passage of a steamboat over the rapids, they ascended as far as Natchitoches.

The health of the bayou settlements south and east, at the distance of a few miles, was partially interrupted by a few cases of bilious fever. Yet Alexandria continued quite heal-

thy until after nearly a dozen cases of yellow-fever had been introduced by steamboats from New Orleans; besides a number of other persons, who arrived in the meantime, from the same port, apparently in perfect health, and who were soon afterwards attacked by the same disease.

The weather about Alexandria, as well as in all the southwest, had been dry and very hot for weeks together. About the last of July the newspapers of that place complain that "the air at times was almost insupportable"; and that "the town was dry, dull, and healthy," with the mercury in the thermometer ranging from 84° to 92° daily. Such was the state of things in Alexandria when the epidemic was making its first advances in New Orleans; and in a few days more, the atmosphere would have been sufficiently infected to have generated an epidemic there, it being then the head of steamboat navigation from New Orleans, and the point of disembarkation for the swarms of Texian emigrants. An unusual rise or flood in Red River, at this critical juncture, postponed the epidemic for nearly six weeks. Red River continued in flood more or less until late in August, so as to admit the passage of steamboats for that length of time, over the rapids, as far as Natchitoches and farther. That place immediately became the principal destination of the steamboat trade; and Alexandria for the time was relieved of the swarms of emigrants daily ascending to upper Red River and to Texas, as well as of large quantities of freight and goods from the infected district of New Orleans.

So soon as the river subsided to a low stage again, and the rapids were impassable, Alexandria again became the head of steamboat navigation from New Orleans, about the last of August. It was a second time the depot for all the passengers, emigrants, and freight of every kind, shipped for the upper Red River country. At this time, early in September, the epidemic in New Orleans was beginning to sweep off its scores every day; and every steamboat which arrived at Alexandria introduced more or less *fomites*, besides occasional cases of open

yellow-fever, and many persons with the infection dormant in their systems. Cases of yellow fever immediately began to manifest themselves in that part of the town near the river, and in boarding-houses near the steamboat landings. By the 20th of September yellow fever was epidemic in the place; and it prevailed over the whole town before the first of October, although the majority of the people had fled to the country. So strongly infected was the local atmosphere of the place, that several persons from the country, who imprudently visited the town at that time, contracted the disease several days afterwards, and died in the country.

The disease was checked by the cold weather about the first of November, after *one hundred and five souls* had perished. Of these only six were females. The majority of all the deaths and cases occurred among emigrants, boatmen, or transient persons, principally from New Orleans.

Dr. Jackson of Alexandria, and other intelligent gentlemen, assured me that there was not a case of yellow fever in that place until it was introduced by the steamboats from New Orleans. Among the first cases were the engineer of the Houma and some of the crews attached to the Velocipede and Washington steam packets, which run regularly in that trade. The disease first spread from the common boarding houses, where the engineer and other hands of those packets had been left for medical attendance. Those who kept the houses were among the early subjects of the disease.

10. *Natchitoches.* The cases at this place were comparatively few, and were altogether in those who had arrived from New Orleans with the infection in their systems, or were open cases of fever discharged from the boats. These occurred also before the last of August, while the river admitted steamboats over the rapids, and while the epidemic in New Orleans had not reached its greatest degree of virulence. The fall in the river, very opportunely, as the epidemic in New Orleans was approaching its most malignant grade, cut off further intercourse, and this preserved Natchitoches from a fatal epi-

demic. The Washington packet in her last trip left several persons sick of yellow fever at Natchitoches, who afterwards died. Natchitoches is 150 miles by the river above Alexandria, on the south-west bank of Red River, upon fine ancient alluvion, skirted by rolling pine uplands in the rear; population about 500.

I have not been able to learn that Natchitoches has ever been visited with epidemic yellow fever, as the rapids near Alexandria serve as an excellent natural quarantine ground, during the epidemics in New Orleans.

Having finished our notice of the river towns in which yellow fever prevailed in the autumn of 1839, we will proceed to note a few other points in Louisiana, upon the bayous south of Red River. In several towns of this region, likewise, yellow fever was introduced from New Orleans by steamboats. We desire the reader to bear in mind, that our steamers pass from New Orleans to the distance of 400 miles and return every week; and where the distance is much less, they perform their trips every three or four days. As yellow fever infection lays dormant in the system from three to nine days, before it manifests itself in open disease, persons may travel on steamboats to the distance of 300 and even 500 miles, in perfect health, after they have contracted the disease. If the distance is less they may arrive at their destination several days before the disease develops itself in their systems. There is no part of the southwestern settlements of Louisiana which is more than 250 miles from New Orleans, by the steamboat route; of course the trip to and from the city is performed every week at most, when the business is profitable. At the outbreak of an epidemic in the city thousands of persons leave it within the first three weeks, and disperse through the numerous inland towns within one hundred and fifty miles direct from the city. These points they reach on steamboats in 24 or 36 hours. Under the excitement of anxiety, alarm, and apprehension, the equable condition of the system is disturbed, and many are attacked soon after they



reach their destined asylum. Those towns to which many persons, with their families, clothing, bedding, and the like, resort, are greatly exposed to the danger of an epidemic; and especially if the condition of the general atmosphere be favorable to its dissemination. In this manner the yellow-fever was introduced into the following towns in the autumn of 1839:—viz., Thibedeauxville, Franklin, New Iberia, St. Martinsville, and Oppelousas.

1. *Thibedeauxville* is situated on the south side of the Lafourche, about forty miles from its efflux at Donaldsonville, and 125 miles, by steamboat route, from New Orleans. The population is about 300 souls, chiefly Creole French, and some Americans, and transient persons. In low stages of the Mississippi, steamboats cannot pass from the river into the Lafourche, on account of the shoal bottom for several miles of its upper course. At such times the small steamboats which remain in the Lafourche, run regularly from the upper to the lower settlements, a distance of about 100 miles. Donaldsonville then is the depot for the freight and passengers from New Orleans for the Lafourche, and is connected with the Lafourche line of boats by a portage of a few miles. Thibedeauxville is the central town for these settlements, and a regular landing point for steamboats.

In this place the population enjoyed uninterrupted health, in the fall of 1839, until many persons arrived from New Orleans, towards the last of August, for retirement from the epidemic. The *first five or six cases of yellow fever* were unquestionably in persons recently from that city; and none pretend to question the fact, that these cases were introduced from New Orleans. Cases occurred subsequently during the month of September, until the whole number was about *twenty-five*. Some of the latter could not be traced to New Orleans, but to infection or *fomites* introduced from that city. The disease did not prevail as an epidemic, for the greater number of cases were contracted in New Orleans. Mr. W. B. Shields, an intelligent planter in that region, as-

tures me of these facts. The number of deaths in this town was about fifteen.

2. *Franklin.* This town, like the last, is situated on high alluvion, on the Teche, at the head of steamboat navigation in low stages of the river. The distance from New Orleans by the steamboat route, is about 250 miles. There is also a more direct route in high stages of the river. The trade by steamboats with New Orleans continues all the year. Population 250.

This town, like all the interior towns, was uncommonly healthy during the summer until after yellow fever had become epidemic in New Orleans, and many persons flying from that disease, had arrived from the city about the first of September. In addition to which, in the first week of September, a steamboat arrived from New Orleans with many persons on board, several of whom were attacked soon afterwards with yellow fever, besides *two cases* which developed themselves on the way, one of which died before the boat reached Franklin. This boat proved to be infected; for several persons died who had not been exposed to any other source of infection, and who were attacked with yellow fever a few days after having made a visit to this boat. The clerk of the Parish court was one of them. In less than a week after this boat arrived at the landing, several persons in that immediate vicinity took the disease and also died. The disease was considered epidemic after the 15th of September, and did not cease until checked by frost early in November. The number of deaths in the village and vicinity, was about 25; the whole number of cases about 45.

3. *New Iberia.* This town, like the last, is situated on the Teche, and upon high ancient alluvion, about 30 miles above Franklin, and at the head of low tide-water. The population is about 160.

This village continued very healthy until about the 10th of September, when cases of yellow fever began to present themselves in the persons of those who had recently arrived from New

Orleans, by way of the Plaquemines. Such were the first cases of yellow fever in New Iberia, in 1839. I am not apprised that the disease was ever there before.

Soon after the first cases of this kind, the disease began to spread among those of the place who had been exposed to no other source of infection than the steamboats, the sick, and the *fomites* imported in those boats. The whole number of *deaths*, in and near this town, was about *twenty*. For the facts I am indebted to the Hon. B. G. Tenney, and other intelligent men.

4. *St. Martinsville* is also on the Teche, and about 80 miles by the bayou above Franklin. This village has been noted for its general salubrity, and yellow fever was unknown there until 1839. Several cases occurred, as was the case at Natchitoches, in persons who had arrived from New Orleans; but being in a great measure cut off from a continued supply of cases and *fomites*, by low water, it did not become epidemic in this village.

5. *Oppelousas* is a small, scattered village, situated in a rolling prairie, proverbial for health, and remote from all those causes which are said to generate yellow-fever miasm. It is remote from any navigable stream, and the nearest steamboat landing is nearly six miles distant. With this point, however, the village has direct and constant intercourse by a regular line of daily stages; and thus a direct communication is kept up from New Orleans to Oppelousas. The route between the two points is made in less than 48 hours: a boat may leave New Orleans, loaded with freight and passengers, together with yellow-fever *fomites*, and in 48 hours one half of the whole cargo, and all the passengers, may be in Oppelousas. The intercourse is not discontinued during the whole year; and previous to the experience of 1839, it was supposed, even by those who were well convinced of the importable nature of the disease, that the interruption in the route by a land portage of six miles, was a sufficient guaranty of safety.

This village has long been a resort for many of the inhabitants of New Orleans, when compelled by the epidemic to re-

fire from the city; and in no case have I been able to learn that yellow fever has been ever communicated in its epidemic form, to the inhabitants, until the autumn of 1839. This year the health of the place was uninterrupted, until the first of September, when cases of this disease began to manifest themselves in the persons of those who had recently arrived from New Orleans. For ten days it was confined exclusively to the people of New Orleans, and those recently returned from that city, with whom the village was thronged. Cases multiplied daily, and by the middle of September it was considered as epidemic, when most of the people deserted the place. The disease was epidemic until November, when the number of deaths had increased to *forty-seven*, of whom seventeen were natives of the place.

An infected atmosphere was created, and *first*, especially in some houses where cases had occurred. Some persons from the country, in perfect health, contracted the disease and died after having made a short visit to those houses, supposed to be infected.

Nor was the dissemination of yellow fever from New Orleans, restricted to the inland towns of Louisiana and Mississippi. It was carried likewise to Texas. The principal port of Texas is Galveston, about 500 miles by the sea route from New Orleans. This route is made by the regular packet steamboats in less than 60 hours. Thus, in two days and a half, a steamboat loaded with freight and passengers from the infected port of New Orleans, will be discharging the same at the wharves of Galveston. This kind of intercourse is almost daily during the whole business season. From Galveston to Houston is a drive of eight hours by the stage; and the intercourse is direct and uninterrupted. The port of Galveston has little or no direct trade with any foreign port except New Orleans—it is situated upon an island of sand and of course not in a miasmatic atmosphere, according to the common doctrine. Yet it did become infected with yellow fever as an epidemic, and many lives were lost. Others died with yellow fever at Houston, who left New Orleans only 8



or 10 days before. Galveston received the seeds of the disease from New Orleans, and from New Orleans alone. I am well aware that the Galveston epidemic has been ascribed to the magic influence of marsh miasm, city filth, and impure wharves. It began about the wharves and shipping, we admit, as it does at every port.

If we examine into the circumstances of its prevalence on the northern coast of the Mexican Gulf, from New Orleans eastward to St. Augustine, and even to Charleston, we shall find abundant reason to infer that in the more important ports, yellow fever was introduced from Havana, Vera Cruz and other ports in the West Indies; while in the smaller trading towns it was introduced from New Orleans, Mobile and Charleston. All the commercial ports suffered from the disease in direct proportion to the amount of direct trade with the West Indies, and the smaller towns suffered in due proportion to the direct intercourse with these infected ports of the United States. Other towns, whose latitude and situation, according to the common views of the yellow-fever miasm, would be most exposed to this disease, were entirely free from it, when their intercourse was cut off with the infected ports.

1. *Bay of St. Louis.* This is a small village situated upon the bay of that name, about 60 miles east of New Orleans. This village is entirely without commerce or intercourse with any foreign port, and is made up chiefly of cottages and villas occupied by wealthy families from New Orleans in time of epidemic yellow fever, and at other times as a pleasant summer retreat from the heat and crowded population of the city. The site was chosen for this purpose as one peculiarly free from all the usual sources of disease of all kinds. It is upon a flat sand beach remote from marsh vapors and exhalation, and has always been considered as remarkable for health, and as such, has been a frequent resort for invalids from the interior of Louisiana and Mississippi. The cottages and villas are extremely neat and airy, spread chiefly in one range of buildings at the distance of nearly fifty yards from

each other. Besides these there is an extensive hotel for the accommodation of those who have no permanent provision for a residence. There is one steamboat wharf, but no trade or commercial intercourse with any port except New Orleans, and of course none of the usual accumulations of city filth.

Yet when this village has been much frequented and thronged by individuals and families from New Orleans, with constant intercourse by steamboats with the city during the epidemic, it has been repeatedly visited also with yellow-fever cases; and occasionally an infected atmosphere has been generated in one or more houses, from which the disease has been occasionally propagated to those who had been exposed to no other source of infection; and the people have been compelled once or twice to desert the place for safety. The first cases of yellow fever at any time occurring here, have been unquestionably those who had retired from the epidemic in New Orleans or Mobile. In 1839 there was a number of such cases here; but an infected atmosphere was not generated which would produce the disease in those who had been free from any other exposure. What local accumulations of filth, or what marshes are here to generate yellow-fever miasm?

2. *The Bay of Biloxi* is about 30 miles further east, and about 50 miles west of Mobile Bay. It is situated upon the margin of the sea, and like the last, is formed chiefly by about 30 cottages and elegant villas, strung along the beach for several hundred yards. This place is one of common retreat for the two cities of Mobile and New Orleans during their epidemic visitations. Scarcely a season passes, in epidemic years, without several cases of yellow fever, developed in those who arrived apparently in perfect health from one of these infected cities. Yet, like St. Louis, it has been mostly free from an epidemic form of disease. The simple reason for this is, that the local atmosphere in these places is not sufficiently contaminated by a crowded population to form a suitable nidus for the reception of the infection or *fomites*. These facts are given upon the authority of G. L. C. Davis, Esq., an old resident of New Orleans familiar with these pla-

ces, and it is corroborated by the authority of hundreds. In 1839 seven cases of yellow fever occurred at Belman's Hotel near the steamboat wharf, and the local atmosphere of the Hotel became infected, as was evident to all interested. Several persons contracted the disease from that house.

3. *Mobile City*. This city has an extensive commercial intercourse with the West Indies and other parts of the world. The direct intercourse between Mobile and tropical ports is no more restricted than that of New Orleans, except in point of commercial importance. Besides this it has constant intercourse by steamboats and sea vessels with New Orleans. Owing to its own direct trade with the West Indies; it becomes infected with yellow fever almost simultaneously with New Orleans, while those towns which derive their infection from either, or both, are not visited by the disease epidemically for several weeks after it has prevailed in one or both of these cities. The disease in Mobile is no less fatal than it is in New Orleans. The average mortality in both is at least *one-third* of the whole number of cases; whereas in inland towns the mortality seldom falls short of *one half*, notwithstanding the assertions of some men to the contrary.

The disease in 1839 made its appearance among the shipping at Mobile, simultaneously with the same disease in New Orleans. In both places, the first cases were among the shipping exclusively, or among those who had frequented certain vessels. At Mobile the disease was advancing *pari passu* with that in New Orleans until the 20th of August, when a south wind sprung up for several days, and the disease, for a while, appeared to be arrested. But by the *third* of September it began to spread with great virulence, and extended to the inhabitants of the city. It continued to spread among them for nearly six weeks, with great mortality, until the 20th of October, when it began to abate after a strong wind and change of weather. On the first of November the disease was considered extinct. The total number of deaths was about 650—of these, 147 died in August, 383 in September, and 120 in October. On the first and second days of September there were 22 deaths; and 127 in the *next seven* days.

4. *Pensacola* is situated upon a bay of the same name, about 20 miles east of Mobile, and nearly in the same latitude; but having no West India commerce, it escaped yellow fever. Although this town had suffered severely in former years, from epidemic yellow fever, yet in 1839, when every commercial port was ravaged by that pestilence, Pensacola escaped. Why was Pensacola exempt? Its population was far more numerous than many towns of Louisiana which suffered severely; it is in the same latitude of towns infected, and as far south as Mobile. Why then did it escape, if yellow fever be endemic on this coast? We answer, that Pensacola escaped yellow fever this year, simply because it was not introduced there as it had been in other towns and ports. Pensacola was not crowded with persons who had already imbibed the infection; the town, the stores, and houses, were not filled with goods, clothing, beds and the like from infected towns or ports; it did not carry on a free and extensive commerce with infected ports of the West Indies, with arrivals almost daily of ship-loads of infected air from Havana and Vera Cruz. The streets were not thronged with raw Europeans or unacclimated strangers. These are the negative causes of her exemption.

Pensacola is a naval station, and during the summer and autumn of 1839, the harbor contained a large number of vessels of war, with their complement of sailors and marines. During the greater part of this time, there were at least 30 vessels of war, with their aggregate complements of 3500 men, besides the ordinary population of the place, giving an aggregate of at least 5000 souls.\* Yet on the 31st of August, at the very time when yellow fever was ravaging New Orleans and Mobile, the whole population of Pensacola, including the fleets, was perfectly healthy.

During the epidemic season the United States squadron lost five men by yellow fever, having contracted the infection before entering the harbor. The French frigate *La Gloiré*, en-

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\* See Pensacola Gazette, Aug. 31.



tered the harbor with twenty cases of yellow fever on board. Due precaution was taken to prevent intercourse with the population of the town; the frigate was anchored out in the bay, and the sick were carried to the Navy Hospital, for medical aid. The disease was circumvented and it disappeared.

The French frigate had not become infected, as the air on board had not been contaminated with the infected air of the West India ports, by lying for weeks at the wharves, as merchant vessels do; the men had contracted the disease by going ashore at such places, and the vessel was prevented from being infected by the early removal of the sick to the naval hospital. The disease did not spread at the hospital, because, as we have before remarked, the air in a hospital is not prepared for the dissemination of the disease, like the air of a crowded town or city. The restricted intercourse between the population and the naval forces, prevented the extension of the disease in the town.

The first epidemic in Pensacola, after it passed into the possession of the United States, was in the summer of 1822, or one year after it had ravaged St. Augustine. Up to that period it had been remarkable as a place of extraordinary salubrity. But immediately after the influx of northern emigrants, a trade sprung up between this town and the West Indies, and the yellow fever was introduced. Mr. Williams narrates the facts, and after yielding to the vulgar prejudice, in admitting that it was partly caused by filth and putrescent matters near the harbor, he proceeds to say: "*the pestilence spread like wild-fire*, immediately after the distribution among the huckster shops of the cargo of spoiled fish which *arrived from Cuba*, sweeping whole families, and often whole streets, in one general destruction." The mortality, he informs us, was altogether among the recent population; "*for none of the old inhabitants were afflicted with the pestilence.*"\*

Here it would appear evident that the active poison which produced the epidemic was certainly brought *from Cuba*, even

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\* Williams' Florida, pp. 15, 16.

if it were in the "*spoiled codfish*." Like most other cases of a similar nature, it is likely that the codfish were distributed, sold and eaten, without any discovery of their spoiled condition, until after the close of the epidemic, when probably this plausible conclusion was arrived at. Every shop-keeper who supplied himself with these fish, doubtless *visited the vessel*, and contracted the disease in person, from the infected vessel.

How was it in 1825? Pensacola was thronged with northern adventurers, with trading vessels, and numerous importations for the new settlements, and yellow fever was introduced and prevailed with most destructive mortality. Hence there is nothing in the situation or location of Pensacola, which renders it more exempt from, or more liable to yellow fever, than any other town, under the same contingent circumstances.

The *first* epidemic yellow fever on record at Pensacola, was in 1765, at the close of the French and Spanish war, immediately after a British garrison had taken possession of the province of Florida. "A regiment of soldiers was sent from England to Pensacola, during a very hot summer. On their arrival they were confined day and night within the walls of the fort at Barrancas, which excluded the sea-breeze. They soon became infected with malignant fever, which proved very fatal to the common soldiers."\* This epidemic was thus introduced by way of the West Indies, where all the troops of Great Britain were obliged to pass on their destined route. These troops, chiefly fresh from England, with their European constitutions and habits, were brought through the West Indies to Florida, at the very time when yellow fever was epidemic in those seas. They were quartered in a confined fort during the most oppressive heats of summer, under all the circumstances calculated to generate infectious air. This was soon accomplished; and the introduction of supplies of clothing, arms, &c., from the West Indies, furnished them with the active cause of disease, if they did not bring it with them on their first arrival. Those troops in the port, which had no commu-

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\* Williams' Florida, p. 15.

nication with the garrison in the Barrancas, continued to enjoy perfect health.

Let us inquire into a few other points along the northern shore of the Mexican Gulf. We find Mobile, a commercial city, desolated with yellow fever. At the next bay only 60 miles distant, Pensacola, *not a trading town*, but having at least 3500 men in the harbor, besides her own population, entirely escapes disease; and although twenty-five cases were introduced into the open suburbs of the town, no epidemic supervenes. A little further east, we find the little port of *St. Joseph's*, where a lively trade had sprung up a year or two previously for the new settlements on the lower Apalachicola, with direct intercourse with New Orleans and Mobile, as well as with the West Indies, ravaged by the same pestilence which was then prevailing in those ports. A little further east and south, on the western side of the peninsula of Florida, is Tampa Bay. This point, also, within the last two years had attracted a smart trading intercourse from the same ports, and after the Seminoles had been driven back, was thronged with settlers and adventurers. This place too became infected, and many of its inhabitants died. Other points were visited in the same manner.

*St. Augustine*, on the eastern side of East Florida, had been proverbial for health during the Spanish régime, and was never visited with yellow fever until it came under the jurisdiction of the United States. But in the autumn of 1821, having become thronged with northern emigrants and unacclimated adventurers (and mainly on account of its proverbial salubrity), it was suddenly visited by a most fatal epidemic, which swept off a large proportion of all who were attacked.

In 1839, the population of this town was quite healthy until about the middle of August, when yellow fever of a very mild character prevailed to a considerable extent. The place labored under this epidemic from the middle of August until the 12th of November. During this time, out of *seven hundred cases*, only about *fifty* died—or *one in fourteen!!* Most cases yielded readily to a judicious mode of treatment. *Yellow fever* never has prevailed epidemically in the United

States, I am persuaded, where there were *more than two recoveries to one death*, including all the genuine cases of yellow fever.

In 1839, I am strongly inclined to think, that St. Augustine was visited with epidemic *bilious* fever, besides a few cases, comparatively, of yellow fever, which may have been communicated from the shipping to those who visited their holds and cabins.

In regard to St. Augustine, the *first epidemic yellow fever* occurred under circumstances similar to those which attended the first epidemic in the Barrancas at Pensacola, viz.: the change of régime. In the latter it broke out upon the occupancy of the place by British troops by way of the West Indies; in the former, or St. Augustine, it broke out soon after the place became occupied by the United States. Mr. Williams\* states that "in 1821 St. Augustine was visited with yellow fever. It broke out in several buildings situated in the back part of the city, which had been for a long time closed up, their owners having retired to Havana. On the cession of the country to the United States, a *sudden increase of population* caused these houses to be thrown open and *rented to strangers*. One of them was rented to several American officers, and three of them fell immediate victims to the fatal disease. *In some cases the sickness commenced in vessels lying in the harbor, which had brought fruit from Cuba. One of these, on the voyage, had lost the captain and most of the crew by sickness. Some early cases of fever were traced to other vessels.* . . . . Since that period St. Augustine has been distinguished as one of *the most healthy spots in the United States.*" This is a simple, unvarnished narrative, unswayed by prejudice or theory, giving the facts without comment.

6. *Savannah*, the principal commercial port of Georgia, is liable to frequent visitations of epidemic yellow fever. In 1839, the population of the city was uncommonly healthy for at least three weeks after cases of yellow fever began to appear.

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\* Williams' Florida.



We do not design to trace the origin and spread of the epidemic in Savannah, but merely to note the fact, and refer to the circumstance of its appearance among the vessels in the port, several weeks before it became epidemic in the city. The intelligent reader who has perused the previous pages, on the importable character of this disease, can make his own inferences. It first spread from the shipping to the population near the wharves.

7. *Charleston, S. C.*, has been an important commercial port from the earliest settlement under the British Crown. The first epidemic yellow fever in this place, was in the autumn of 1700. It likewise prevailed again in the years 1732, '39, '45, '48, and '92. In more recent times it has been visited occasionally with this epidemic, in its most malignant form. And it is clearly proven by the records of the times, that there have been occasionally cases among the vessels in port, when no epidemic supervened.

We propose briefly to examine the circumstances connected with the prevalence of yellow fever in this city in the fall of 1839, and its *subsequent appearance* at Augusta in the interior of Georgia.

The newspapers represent Charleston as having been remarkably healthy until the first of July. A few cases of yellow fever had occurred among the shipping in port soon after the middle of June; and cases from the vessels were received into the marine hospital on the 25th and 26th of June,\* at which time cases were frequent among the shipping. The Charleston Courier, of the 24th of June, 1839, says up to that time, "the cases of yellow fever were few in number, and *confined exclusively to a few vessels* in our harbor, and to *seamen on board those vessels*;" again, "*not a single case had occurred on shore*." The same paper again declares, that, up to the 24th of June (1839), "*among the vast number of persons now in our city, liable to yellow fever, not a landsman has been*

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\* See Dr. Strobel's Report as Physician to the Marine Hospital. See also the Charleston Courier and New Orleans Bulletin.

*attacked by it."* The number of cases began to increase daily among the shipping, and chiefly among the crews who were unacclimated. During this time the papers of Charleston continued to repudiate the doctrine which admits the possibility of yellow fever being in any case contagious, or in any wise communicable from the sick to the healthy population; they endeavored to calm the fears of the people against all possible danger, as it possessed, in their opinion, no more communicable properties than bilious or intermittent fever. In this manner they made themselves responsible for the death of hundreds. Many, relying upon such advisers, neglected the necessary precautions; intercourse with the infected vessels was indirectly encouraged, and by this means it was soon disseminated among the contiguous population; and in a few days more it was epidemic among the people residing near the wharves adjacent the infected vessels.\*

On the 10th of July the Charleston Mercury urged in very strenuous terms the necessity for "captains and owners of vessels" to be prompt in procuring medical aid, in the *first* attack, while the mass of the citizens were, in effect, encouraged to introduce the disease into the city. The laboring classes as usual, and those who carry on the commercial transactions with the shipping, were the first victims among the inhabitants. The disease continued to spread slowly from the shipping to the population adjacent to the wharves, until the last of July, when it was admitted to be epidemic in the city.†

It is not my purpose in this or any other case, to point out the particular vessel which introduced the disease, because I believe that many are concerned in its introduction; it is the work of some days or weeks, and each vessel from an infected port, has its special agency in inducing an epidemic. There were vessels in the port of Charleston, with yellow fever on board, as early as the 7th of June. The brig *Burmah*

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\* See New Orleans Bulletin, Aug. 10, 1839, quoted from N. Y. Express.

† Charleston Mercury.

is the first that we can refer to; the brig Braganza was soon after there with yellow fever on board, and many others subsequently.

All agree in the fact that for fifteen days after the disease began to excite alarm, it was confined exclusively to the shipping, and such as came from West India ports. Yet the public press, without evil design, we are sure, endeavored to bolster up the belief that it was a local disease, and a mere grade of bilious fever, produced by local atmospheric influences, although the resident population was at first exempt; while those who were least exposed to such influences, if they had existed, were the only victims. But blinded by an interested prejudice, they would not see.

As soon as the people perceived that the pestilence was extending the sphere of its action, they immediately adopted the usual and only measure for safety, and fled to the country. The rail-road to Augusta offered the most convenient and direct conveyance, and accordingly many embraced the opportunity of retiring to that high and healthy interior town, in the State of Georgia, *where yellow fever had never been known*. Some took with them beds, bedding, goods, and the articles usually taken by retreating families and merchants.

The disease was epidemic in Charleston from the first of August until the 20th of October, when it began to decline in virulence. The number of deaths I have not been able to procure.

*S. Augusta, Ga.* This city, within a few years, has become an important *commercial* depot for importations made through Charleston and Savannah for an extensive region of country in the interior of Georgia and South Carolina. It is also the point at which a great portion of the interior cotton crop of these two States is collected for those two maritime ports. As such depot it is the head of steamboat navigation on the Savannah river; and in 1839 was the *terminus* of the great Charleston rail-road. It is situated upon the Savannah river, 230 miles above the port of Savannah, and 120 miles by the rail-road from Charleston. The site is chiefly tertiary up-

land formation, in a high and healthy region, beyond the influence of marsh miasm, and all those matters to which yellow fever epidemics in maritime ports are ascribed.

Previously to the summer of 1839, it was proverbial for its salubrity, and noted for its *exemption* from yellow fever during all the ravages of that disease in Charleston and Savannah. Such had been its exemption from this disease at such times, that it furnished a plausible argument against the probable *importability* of the disease; for if importable at all, it might have been at some time transported from Charleston or Savannah, with which constant intercourse was maintained. As such, the fact was used by professor Dickinson of Charleston, in his remarks upon the *yellow fever* of that city in 1838. When those remarks were penned early in the summer of 1839, little did the learned professor think that nature herself would so signally confute the argument and vindicate truth and the immutable laws of nature; that even before his "remarks" met the public eye, she would snatch from him the argument which had been fallaciously used by many others in a similar manner.\* But like a philosopher and a votary of scientific truth, he received the lesson taught by nature and renounced his error.†

\*See Med. Journal published by John Bell, M.D., Philadelphia, December 1839.

†In a letter to Dr. Strobel, of Charleston, dated January 14th, 1840. and published in the Charleston papers, and re-published in the New Orleans Morning Advertiser of December, 1841, Professor Dickinson acknowledges his change of opinion relative to the *importable* nature of yellow fever infection; viz—"I believe yellow fever to be *transmissible or communicable from one city to another*, provided the general circumstances of the two are similar or analogous; that is, I believe the unknown and *obscure cause of yellow fever is transportable from place to place, and in a variety of modes*. This cause requires for its efficiency an undefined occurrence of favorable circumstances, without which it will fail to produce its specific influences; but this is true of the agency of every cause of disease.

Of its contagiousness (using the word in its limited and popular sense), its direct propagation from one subject to another, I have never witnessed an example, and *until recently* should have denied the possession of this property in our climate. *The events of the last summer,*



Augusta remained uncommonly healthy for fifteen days after yellow fever had been epidemic in Charleston, and for nearly ten days after it had been epidemic also in Savannah. Within a few days after the general alarm and flight from Charleston, cases began to appear in Augusta, and chiefly in those who had retired from those infected points, until about the 15th of August. On the 17th and 18th of August, cases began to multiply, and on the 20th it was considered epidemic. From the 18th to the 31st of August, the deaths were only twenty-eight. From that time until the last of September the disease raged with great mortality, after which it began to abate. The number of deaths in the month of September was reported at one hundred and seventy.

The history of this epidemic will show that Augusta was exposed to a double source of infection; first, by the rail-road from Charleston, upon which the train of cars arrive in eight or ten hours; and secondly, by steamboats which reach Augusta in thirty-six hours from Savannah. The former makes daily trips, and the latter are successively arriving once or twice a week, with every variety of articles which retain the infected air in them.

The continued arrivals upon the cars, of persons with the latent seeds of yellow fever in their systems, to be soon developed in open yellow fever, besides other modes of introducing infection, tended strongly to accelerate the epidemic constitution of the city air for leading on the epidemic.

As soon as the inhabitants of Augusta were convinced that they were invaded by this unwelcome visitation, they immediately fled from the city and took refuge in the surrounding country. The physicians of the place, who believed in the local origin of yellow fever epidemics, as usual, began to search

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however, have inclined me to entertain an *opposite opinion*. An impartial perusal of the statements and arguments of Pym, Blane, Arejula, Wistar, Hosack and Monette, has satisfied me that it deserves to be ranked among contagious diseases.

I am sir, respectfully, your obedient sev't.

B. B. Strobel, M. D.

Saml. Henry Dickinson "

for the usual imaginary sources of the miasm. It would have been strange if they had not been able to discover some innocent collection of animal or vegetable matter, which would serve, with the credulous, as a scape-goat to bear off the sins of the commercial members of the community who had been instrumental in its introduction, while it diverted the attention of the intelligent from the true cause of the disease. Accordingly the press soon announced that they had discovered "a pile of putrescent vegetable and animal matters near the upper trash-wharf," which no doubt had at once caused all the mischief, although it had remained there in a harmless state since the first of June!

Why did not yellow fever manifest itself in Augusta at the same time it made its appearance in Charleston and Savannah? Why was the epidemic in Augusta deferred until Charleston and Savannah were almost deserted by their inhabitants and the transient population? Why did it not commence in Augusta first, if it proceeded from local causes? Did the arrival of the people from those infected cities excite the extrication of pestiferous miasm from local causes, which had laid dormant up to that time?

We have shown already that an infected air is often generated or imported in vessels arriving in our ports from the West Indies, and that persons have beyond doubt, contracted yellow fever by visiting such vessels after they had arrived. The same atmosphere is likewise generated in steamboats from infected towns. Cholera has in like manner been introduced into many towns within the valley of the Mississippi, as I have abundant evidence to prove, during and subsequent to the Black Hawk war, on the upper Mississippi, several years ago. A cholera atmosphere may be generated from a number of cases on any steamboat or vessel, or in any house or town. The same is true of yellow fever under favorable circumstances in the local atmosphere of any given town.

Professor Dickinson, before cited, observes: "*Cholera is im-  
portable.* It may be conveyed from one city to another *by a  
vessel*; or it may originate during an unfortunate voyage on

board a vessel, which shall not only disease her passengers, but will infect persons who may venture on board in perfect health, after her arrival in port. In either case, the vessel herself, or the atmosphere which she contains, shall be in a state capable of communicating the disease to those who visit her. Cholera is, therefore, clearly a proper subject for quarantine regulations, and these should be strict and perfectly effectual.”\*

This is precisely the case with yellow fever during the hot and oppressive weather of summer in the southern part of the United States. The whole weight of impartial testimony sustains the position; and as it has been known to produce the most malignant and terrific epidemics in the ports and towns of the United States, we deem it a most important and proper subject of quarantine regulations for the protection of our citizens.

This point we shall endeavor still further to sustain and elucidate by facts and reasoning, which we desire to submit to the impartial reader and the candid enquirer after truth.

#### ORDINARY MODE OF INTRODUCING INFECTION.

The manner in which infection is introduced into towns and cities on the lower Mississippi, is through the medium or agency of ships or steamboats, as we have already shown in the early portion of our remarks. New Orleans is the point from which it is communicated to the interior river towns; and this city itself, in like manner, is annually supplied with a due portion of *fomites*, and infected air from West India ports, imported chiefly in trading vessels, which arrive almost daily from all those ports where yellow fever is known to be endemic at nearly all seasons of the year.

When any town or city, and especially those south of lat. 35°, contains *infectious air*, as already illustrated, that place is in a *proper condition* for the dissemination of *yellow-fever infection*, and for the prevalence of a fatal epidemic, although

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\*See Am. Jour. Med. Sciences, 1833, vol. 13, p. 359-60.

the population may have been entirely healthy immediately previous to the introduction of such infection. If this condition of the local atmosphere exists in an eminent degree, a smaller amount of infected air, or *fomites*, will generate the epidemic; if this condition of the local atmosphere is less concentrated, a larger amount of infection or fomites is requisite to produce the same effect; and a town or city in the latter condition may escape an epidemic, after the introduction of an amount of infection, which, under other circumstances, would have generated an epidemic. This position we desire to be borne in mind, for it will prevent the dissenting reader from urging those objections which are nugatory to one who carefully weighs this point.

Hence the arrival of infected ships, and steamboats, with goods on board impregnated with infection, in any port or town, may be eminently dangerous, or it may be comparatively harmless, according to the circumstances of the case. The number of steamboats on the waters of the Mississippi trading to New Orleans is not less than *three hundred*.

All who are practically conversant with yellow fever in the southern States, know full well, that beds, blankets, clothing, and all other porous articles, which remain a short time in a strongly infected atmosphere, whether limited to a single room, house, or ship, or to the mercantile part of a city, become impregnated with the active *materies morbi*, and will produce the disease in those who are subsequently exposed to its operation. It is equally well known that the entire atmosphere in a room will become so thoroughly infected, under certain circumstances, as to produce the disease in divers individuals who may enter such room, and breathe its atmosphere even for a short time.

Let us suppose a case. Yellow fever is epidemic in New Orleans; it begins to carry off its victims at the rate of 50 or 60 per day. Regardless of the danger, hundreds of strangers remain in the city, vainly hoping to escape the disease; one ship after another, crowded with foreign emigrants, German or Irish, arrive in the desolated city, and take up a habitation



in some refuse or desolate houses and sheds. Lured by the high wages for labor, they remain and expose themselves in the infected district, until the disease spreads rapidly among them. Every day diminishes their numbers, and a new focus of infection is generated in their camp or lodgement. Finding that the pestilence increases its ravages daily, without a prospect of abatement, they determine to escape from the city and pass on into the interior. They engage passage on the first steamboat for St. Louis or Louisville. The boat has been lying at the wharf in the infected district for several days, taking in freight of every description, and all more or less impregnated with infection. At length the boat is ready for her departure, and our foreign emigrants are crowded into the lower deck to the number of 50 or 100 souls, men, women and children, a motley crowd, packed and stowed, with their filthy bedding and clothes, into every recess and corner of the boat. They continue to sicken and die in this crowded atmosphere, during the hot sultry weather of August or September; and occasionally the boat lands to take in wood, and to bury two or three deck passengers who may have died the last night. The whole atmosphere in that part of the boat, and every article of bedding, clothing, and the like, becomes thoroughly infected, and will produce the disease in those who visit the boat at the different landings on her way up the river. By the time the boat reaches St. Louis or the mouth of the Ohio, fifteen or twenty of this miserable crowd have been laid in quiet repose along the solitary banks of the Mississippi.

This is not a case entirely of fancy; the parallel complete has been too often witnessed on the Mississippi within the last 20 years.

In many cases boats in this condition, on their ascending trip land at Natchez or Vicksburg, to deposit their sick and dying, and perchance to bury their dead. They relieve themselves of these encumbrances at Natchez, or at Vicksburg, or some other town on the river.

It would be strange, if a succession of boats, in this condition, arriving every day or two, and generally discharging

their sick and a part of their foreign emigrants with the disease dormant in their systems, should communicate no disease in the crowded and stagnant atmosphere of the river towns. Yet because very often one or two houses are first infected, or because a particular district of a town or city becomes first infected, we find some of the medical faculty, as well as the illiterate, adduce this very fact as an argument in support of the extrication of a pestilent miasm from *some local cause* which they cannot indicate.

In all these instances the disease first manifests itself in those parts of towns and ports where the above species of population mostly congregate, whether near the wharves or not. However they generally find their temporary residence near the wharves and steamboat landings, in some of the numerous crowded wooden tenements of those places.

The number of German and Irish emigrants that arrive at New Orleans every summer is almost incredible; and of late years it is the principal port for which they take shipping, on account of the facilities afforded for reaching the northwestern States on the upper Mississippi. These crowd the deck of every steamboat which leaves New Orleans for the upper country during the summer, but especially when the epidemic begins to rage in the city.

The constant arrival of these northern foreigners in July, August, and September, at New Orleans, and many of them touching on their way at West India ports, contribute materially to aggravate the malignity of the disease in that city, and to extend it into interior towns.

Admitting the correctness of the positions which we have assumed, the question which naturally presents itself is this:

*How shall New Orleans and the towns on the lower Mississippi, be protected from EPIDEMIC yellow-fever?*

We answer, they may be protected from devastating *epidemics* by judicious quarantine regulations, properly enforced, near the mouth of the Mississippi, or at any proper distance

below the city. These regulations should have for their object the prevention of any direct intercourse with Vera Cruz, and Havana, or any other West India port, during the time that such port is the seat of epidemic yellow fever. This would necessarily exclude shipping from Vera Cruz generally from and after the first of June; and from Havana, from and after the first of July, varying according to the periods at which those ports become eminently infected. This prohibition should be enforced for two months or more, until the epidemic subsides in such ports.

The quarantine regulations should also embrace some provision for reducing the number of transient, unacclimated strangers or northerners, from and after the middle of July, and also to prohibit the introduction of foreign emigrants into the city between the months of June and October; and, when yellow fever is virulent in the West Indies, the prohibition should be enforced until the last day of October. The danger of any epidemic is always augmented by the influx of northern foreigners during its prevalence. This is well known in New Orleans; and the city press does not fail to warn them of their danger, and vainly to deprecate their arrival.\* The civil authorities should coerce their exclusion, if necessary, during an epidemic, or during the apprehension of one. An epidemic cannot become virulent, and extend its influence rapidly among the resident population, without the aid of a large number of northern strangers and foreigners, who are unacclimated; and during an epidemic they are the fuel which keeps up the fire.

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\* The following extract from the Louisiana Advertiser, of October, 1839, will show the general feeling on this subject, viz.:

*"Food for yellow fever.*—The barque Eleanor, which arrived yesterday morning from Havre, brought to the city sixty steerage passengers, chiefly Germans: they are full-blooded, fresh, and healthy—*inviting subjects for yellow fever.* We looked on them as among the *doomed*; and sorrowed to think that such robust and strong-constituted individuals, should be grappled by so fierce an enemy."

If the disease in its epidemic form can be excluded from New Orleans, every interior town in the south-west, having a direct commercial trade with, and dependence upon that city through the lower Mississippi, will most assuredly remain free from this pestilence; and their citizens may rest secure from the apprehension of danger from that quarter. All quarantine restrictions on the river above New Orleans will be unnecessary; and the interior commerce of the city, with the valley of the Mississippi, will be constant and uninterrupted.

This brings us to speak more particularly on the subject of quarantine regulations, adapted for the protection of New Orleans and other towns on the lower Mississippi.

#### QUARANTINE.

There are in all countries, and especially in commercial cities, men whose pecuniary interests conflict with wholesome regulations for the welfare of the community at large; men whose feelings and views of things mislead their judgments relative to the general good of society. In nothing is this principle more clearly elucidated, than in the opposition usually made to all temporary restriction upon commerce, by sanatory quarantine regulations.

Notwithstanding the apparent efforts, sustained by the commercial interests, and the weight of medical authority in the United States, to abolish all quarantine regulations designed for the protection of our commercial ports, the facts are continually staring us in the face, that *there are certain diseases*, peculiar to tropical ports, or to certain cities and regions of the civilised world, which are more or less communicable from one person to another; and which, when epidemic in any city, may, by a favorable combination of circumstances, which are not well understood, be communicated and disseminated in other towns and ports, which were previously free from any such disease. The two most prominent diseases of this character, are the *plague* of the eastern continent, and the *yellow fever* of the western, not inaptly termed the western plague. These diseases, when communicated from one port to another,



are supposed to be imported solely through the agency of ships and commercial intercourse. When one port or city is more favored by nature than another, either in its location, latitude, or any other circumstance, which renders it exempt from diseases which are endemic in others, it becomes the natural right of the inhabitants, and the special duty of the municipal authorities of such favored port or city, to protect themselves against all the possibilities of introducing a pestilential disease.

As such diseases are caused by some invisible, uniform, and mysterious influence, which manifests itself only in those persons who are exposed to its action; and as the same disease, when produced in a healthy place, is the result of a similar exposure to the influence of a portion of the same atmospheric agent, which may have been, and doubtless has often been carried from infected ports, in ships and other articles freighted in them, it is the dictate of reason and prudence, to *interdict* temporarily, that kind of intercourse with such infected port, which affords the greatest probability of introducing the aerial poison. This temporary interdiction of commercial intercourse with cities which are the seats of epidemic pestilential diseases, has been denominated a quarantine restriction.

The older quarantine regulations, from some superstitious veneration for the number forty, required vessels from such infected ports to remain out of port for forty days: hence the name. Such restrictions, under one form or another, have been enforced from the earliest history of the commercial world; and the world, by common consent, has approved the same. But with the nineteenth century chiefly, and chiefly in the United States, the doctrine has sprung up, and has been propagated, which teaches that the light of science and the march of intellect, at this late day, deem it expedient to expose populous cities to the ravages of pestilence, rather than impose any wholesome restrictions upon the interests of the few, to avert such calamities.

Such regulations have always been opposed by the commercial interests in any port, because it does not ostensibly administer to the pecuniary advantage of that class of indi-

viduals. At length many of the learned of the medical profession have been brought over to sustain this opposition, which, at this time, has become somewhat *popular* in the United States. This circumstance alone is calculated to draw a formidable array of learning and talent against any cause, however sound its positions.

Besides the professions of philanthropy, benevolence, charity and humanity, as the motives which prompt the opposition to judicious quarantine restrictions, many have taken the ground that the disease—the pestilence to be excluded by such means, is *endemic in our ports*; the product of local causes which abound in all our towns, independent of, and unconnected with foreign intercourse: and that consequently it is not to be excluded by such restrictions against foreign importations. Through the name and influence of Dr. Rush and his coadjutors, backed by the allies of the commercial and importing classes, this salutary protection to the population of some of our most important seaports, had well nigh been abolished. Yet they have passed from the stage of action, and their influence, losing its power over the judgments of men, ceases to mislead on this important subject.

New York, Philadelphia and Baltimore, as if for the purpose of testing the doctrine of foreign importation of yellow fever, at the expense of thousands of their citizens, refused to adopt any decided restrictions on the West India commerce until about the year 1822, when the experiment had been fully made. Since that time, the counterpart, and by far the most salutary part of the experiment, has been in operation.

Since the year 1822, the quarantine restrictions enforced at New York and Philadelphia have protected those ports, and for twenty years they have escaped all pestilent epidemics. Yet before these restrictions were enforced, they had been liable to these visitations, no less than six times in 20 years, from 1790 to 1810.

The southern ports of Charleston, Savannah, Mobile, and New Orleans, where quarantine regulations are discarded, are almost annually ravaged by this West India plague. Will not

the same regulations, strictly enforced in these southern ports, be followed by the same salutary results?

It will be remembered that we have already set forth the manner in which vessels and steamboats become infected, and instrumental in the introduction of yellow fever into a healthy port, to which we refer the reader.

*How should a quarantine be enforced below New Orleans?*

We answer, 1st. establish a quarantine ground near Fort Jackson or Fort St. Philip, which shall effectually command the river. From the time that yellow fever has assumed its epidemic form in Vera Cruz, Havana, or any other place, cause any and every vessel from such port, to remain below at the quarantine ground: there let her cargo be discharged, and properly ventilated for 72 hours, at least, day and night, before it is allowed to be taken up to the city: the importing vessel should not enter the port of the city until after frost. At the same time, vessels from healthy ports, which have not touched at any infected port, might be permitted to ascend and discharge their freight at the wharves of the city—provided their crews are perfectly free from disease.

2. Erect a large, airy, brick hospital, at the quarantine ground, for the reception of seamen and others, laboring under yellow-fever, from vessels detained. The buildings should be comprised in an extended row of one-story houses, with rooms about 20 feet square; each room to accommodate four patients.

3. Prohibit, during the quarantine, the entrance of foreign emigrants, or strangers who have touched at any infected port within ten days previously.

4. The Charity hospital, for the reception of the indigent sick of the city, should be located in the suburbs, at least half a mile from the populous part of the city.

It can be well established that whenever yellow fever has prevailed in any port of the United States or in any port of Europe, it was always at a time when a direct intercourse had been kept up between such port and the West Indies where yellow fever is endemic. Whenever it has been epidemic in Lisbon, Cadiz, or Gibraltar, it was immediately preceded by an unusual intercourse from the West Indies to those ports.

This was true, especially, from 1804 to 1814, when large armaments and fleets were constantly arriving from Havana, Vera Cruz, and other tropical ports, during the European wars with Bonaparte.

The same is true of ports in the United States. We have already shown that yellow fever is not epidemic in them except when the intercourse with the West Indies is direct and uninterrupted. This point can be established by a reference to every instance in which it has prevailed as an epidemic in our cities. Dr. Hosack observes, that "during the years in which our commerce with the West India ports was interdicted by the embargo (before the year 1812), and during the subsequent years of war with Great Britain, when our communication with her possessions in the West Indies, and other West India ports, was entirely suspended, *the cities and towns along our whole coast were exempt from the fever of the tropics.* A recurrence to meteorological observations, for that period, will show that the mercury frequently ranged higher, than in those years when the yellow fever prevailed in our cities; and when the general constitution of the atmosphere, which was favorable to the generation of this malignant form of fever, provided domestic causes could engender it, pervaded our country as much as at other times, when yellow fever had prevailed extensively. The local causes in our sea-ports, such as exhalations from our ships, market places, privies, and new-made grounds, remained the same, and in some cases worse than when the yellow fever had prevailed in other years. Yet, unfortunately for the doctrine of domestic origin of yellow fever, the health of our cities remained undisturbed by the deadly visitor."\* The same was true of all our ports during the war of the revolution, from 1776 to 1785. But so soon as peace was confirmed, and a brisk trade was carried on with the West Indies, the yellow fever began to prevail in all our most important ports, from 1790; and it prevailed extensively in some of the principal ports, nearly every other year, until the embargo in 1808 and the war of 1812 so in-

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\* See Hosack's Medical Police.



terrputed the commercial intercourse with the West Indies, that epidemic yellow fever was not known in the United States until the year 1817, when a constant commercial intercourse with the West Indies had become again established. Since that time the intercourse with tropical America has been uninterrupted, and yellow fever as an epidemic has not failed to visit our most important ports, almost every other summer, up to this time.

The great practical error and impolicy of the *domestic origin* of the yellow fever, is this: viz. it leads people to disregard the proper precautions against its dissemination through a dense population; it indirectly encourages its diffusion among a healthy population, by encouraging those habits of careless intercourse by which the limits of the infection is certainly extended; while every measure which tends to circumscribe its limits are neglected or disregarded. Under the belief that it cannot be imported, or even communicated, directly or indirectly (because it is local and indigenous in its origin), many persons are induced to expose themselves to infected ships, houses, and the infected districts of a city, and thereby become instrumental in carrying the disease in their own persons into healthy parts of the cities and towns. This is often the case with persons who have no definite ideas of any of the laws of infection and contagion, and are often blindly impressed with the belief that the disease is "not catching." It leads also to a culpable carelessness with the sick, by indirectly encouraging the accumulation of the morbid effluvia in their rooms, and the accumulation of morbid secretions about their beds and chambers; for, as is very naturally inferred, if no effluvia or morbid exhalation is given off by the patient, why the necessity of cleanliness and ventilation? It encourages a disregard of all sanatory cordons which may be established to cut off the intercourse of the healthy population from the infected vessels, houses, or districts. It is to be regretted that medical men, the proper conservators of health, should be foremost in inculcating doctrines which tend indirectly to lead on these malignant epidemics into our cities.

Medical men are often led by theory, or the force of educa-

tion, to disregard important facts in these epidemics; or to bend them to suit a preconceived theory: but the intelligent mass of the people have neither theory nor the bias of education to mislead them, and they generally judge correctly upon the facts which present themselves. It is a well known fact that the mass of the intelligent population in our southern ports, where yellow fever is often epidemic, are involuntarily led to the conviction, that it is an imported, and, under some circumstances, a communicable disease. They know that ships and steamboats do sometimes become strongly infected while the resident population is healthy. This conviction is produced in their minds, without any desire to sustain any theory, or from any pride of opinion. As the Abbe Du Pratt has remarked, "*there is often a blind impulse in public opinion which arrives by a more speedy and certain method at the truth, than all the reasonings of philosophy.*"\*

Those who oppose all quarantine restrictions, urge the plea that the commercial interests are deeply embarrassed, and the general prosperity of the cities interrupted. These we conceive to be false positions. We contend, on the contrary, that the health, prosperity and pecuniary interests of all classes are promoted by proper quarantine regulations. For example, let us take New Orleans and Natchez, which might be protected from yellow fever epidemics by judicious quarantine restrictions.

When Natchez is the seat of epidemic yellow fever, the whole commercial business of the place may be said to be prostrated for that time; all mechanical business and trade is stagnant for two or three months, and the ordinary income of at least five hundred families† is suspended, and their daily expenses increased fourfold, by flight, sickness, abandonment of property and new expenses incurred by procuring a temporary residence out of the city. In this we have not included the permanent loss which the community sustains in the

\* See Townsend on Yellow Fever of New York, p. 62.

† The entire population of Natchez during the summer is 3500.

death of two or three hundred of the most enterprising and useful citizens, at each visitation, exclusive of an incalculable amount of suffering, privation and bereavement which are but partially indicated by the emblems and weeds of mourning which shroud the community for months afterwards. All this is avoided and escaped during the summers when yellow fever does not visit the city; and with incalculable advantage to the dependent classes.

Whatever may be the foreign trade of New Orleans, it is almost entirely suspended during the prevalence of an epidemic in the city; and, what is of far more importance to the prosperity of the city, the whole inland commerce of the valley of the Mississippi, with a population of more than four millions, is likewise suspended. Besides this, nearly five thousand of the resident population annually leave the city in anticipated fear of an epidemic, and an equal number leave on the certain appearance of the unwelcome visitor. In addition to this, the city suffers a permanent loss by the death of not less than two thousand or twenty-five hundred souls, during each epidemic; and among this number may be reckoned about five hundred enterprising and useful citizens forever lost. We might add, without taking into the estimate the amount of mental and physical suffering, that the charge, responsibility, and expense of providing for, nursing, and interring more than one thousand destitute strangers, is thrown upon the city at each epidemic visitation.

All this may be avoided by excluding yellow fever from the city; and the enforcement of a judicious quarantine near the Balize, and on any other commercial avenue for three months at most, during the prevalence of yellow fever in the West Indies, affords the only prospect of accomplishing this desirable result. New Orleans may be, and at length will be released from this annual pest, if her citizens will it to be done.

The plea of humanity, of philanthropy, in this case so often preferred, as an argument against quarantine restrictions, with apparent sincerity, is perfectly gratuitous. If we admit the position that yellow fever is local in its origin, and

has no tendency to spread among a dense population, and that the multiplication of cases does not tend still further to contaminate the air; and that quarantine restrictions encourage the abandonment and entire neglect of the sick, it then would appear a very plausible argument, *ad captandum*. But denying all these assumptions, we contend that we are entitled to the whole benefit of the argument on the score of humanity and philanthropy. We urge that it is not local and that it can be excluded from our ports; and by so doing we should be the means of preserving the lives of thousands of persons annually in the United States; and we should in like manner protect our citizens from all the privations and sufferings incident to these epidemics, and the concomitant stagnation of every species of trade and business upon which the poor depend for daily subsistence. We *prevent* the misery and wretchedness which others would in vain attempt to *mitigate*, after they have aided in bringing it about.

We have devoted none of our remarks to the treatment of this disease. All the experience of the medical profession in the United States, for fifty years, and all the researches of science, and all the *post mortem* examinations of organs and tissues, have tended to throw no light on the treatment. Under all modes of treatment, consistent with the various theories framed for its cure, the disease in its most malignant type sweeps off into the grave at least one half of its victims, and with as much celerity and certainty now as it did when first introduced into our ports fifty years ago. The milder cases which occur in all these epidemics, will recover under any judicious mode of treatment much more readily than severe cases of common remittent fever. Many of the mildest cases will recover almost without any medical treatment. But the severe cases generally terminate in death, unchanged by any mode of therapeutic treatment. Hence we doubt not that it is much more important to the interests of our cities and ports, to direct attention to *preventing* these epidemics, than to discover the best modes of cure after they have been invited among us.



## CONCLUSIONS.

If the views advanced in the preceding pages be correct, we are sustained in the following as legitimate deductions:

I. That the miasm or gaseous matter which is essential to the production of epidemic yellow fever, is generated only while the extreme temperature in the shade is at least up to 88° of Fahrenheit; and that so long as there is sufficient agitation and change of the air by winds, it will not accumulate in sufficient quantity to produce yellow fever as an epidemic: that when sufficient miasm is produced and accumulated, the malarious combination, which likewise requires several days of calm, sultry weather, will proceed at a still lower temperature.

II. That the miasm of yellow fever, is, *per se*, in a pure atmosphere, probably innoxious; but acquires active morbid properties by combining with sultry, hot air, which has been exhausted by respiration, and charged with human exhalations: and that it then becomes *malaria*, or infectious air, which is an active predisposing cause, as well as a proper "*nidus*" for the reception and evolution of the infection of yellow fever.

III. That this malarious condition of the local atmosphere of any city, or portion of a city, may be so concentrated as to produce a strong predisposition to yellow fever in many of the inhabitants, without actual disease, until after a few cases have been excited into action by highly exciting causes, when *infection* is generated, and speedily the malarious district becomes the infected district: which result would have been prevented by a storm or change of weather previous to those cases.

IV. That when the malarious combination is sufficiently concentrated for this purpose, a large quantity of *infected air*, brought from an infected district, or a large number of cases of yellow fever introduced from another point, will convert that malaria into infected air, and produce an epidemic likewise.

V. That consequently, although yellow fever may to a certain extent be called a disease of local origin, and depend upon a local atmospheric constitution, or contamination, for its extension, yet it may, under some circumstances, be carried from one city to another, and there propagated.

VI. That accordingly epidemic yellow fever may be averted sometimes by one or all of the following measures, enforced at a time, when, according to the principles herein set forth, the malaria is forming rapidly; viz:

1. By a dispersion of the greater portion of the citizens to the country.

2. By removing from the city, and especially from the districts usually infected, all *strangers*, or those who have not become acclimated by a residence of two or three years, and who would of course be the first attacked.

3. By prohibiting the introduction from foreign places of infected air, or *fomites*, or patients laboring under yellow fever during the prevalence of malarious accumulations.

VII. That malaria accumulates most in those parts of cities and towns, where the population is most crowded, and where, from the situation of the ground, or the nature of the buildings and enclosures, the local atmosphere becomes most stagnant; and such accumulations of malaria in the United States take place chiefly in the months of July, August, and September.

VIII. That when yellow fever rages like a pestilence in any city or town, the suburbs, the immediate vicinity, and the whole surrounding country, are entirely free from such infected air, and from all similar disease. Of course the epidemic yellow fever cannot be the result, solely, of "a general atmospheric constitution"—but is the result of some peculiar local contamination of the city atmosphere.

IX. That this local contamination, or infection, *is not* the product of the city filth usually found in streets, alleys, and sewers, and about the wharves; nor is it the product of the decomposition of animal or vegetable matters. under any cir-

X. That when this contamination or infection is once formed in the local atmosphere, none of the disinfecting agents heretofore used, have any virtue in neutralising the infection, or in arresting the progress of an epidemic. Cold, or a reduced temperature, is the only known destroyer of the infection of yellow fever.

XI. When an epidemic has once begun, the only safety to the unacclimated is speedy flight to the country, where the air is pure. When the population of an infected town has fled in great numbers to any healthy town, carrying with them large quantities of clothes, beds, bedding, blankets and porous articles of merchandise, there is great danger to be apprehended, lest the fomites should there generate a new local infection equally virulent with that from which they had escaped. These articles, when infected, are liable to become the most virulent sources of infection, and are purified only by frost or cold weather.

XII. That all steamboats, flat-boats and vessels which remain at the wharves for many days, in an infected district, discharging and receiving freight from the infected district, do often become as thoroughly infected as the houses in that part of the town, and finally become as capable of imparting the disease to unacclimated strangers, as the air in the city houses would, under similar circumstances.

XIII. Consequently such vessels from an infected port, should be prohibited from lying at the wharves of a healthy town, and from discharging their freight or sending into such town yellow fever patients, or in any wise holding intercourse with the population of that town during the months of July, August or September.

XIV. That the cause of humanity, both in relation to the sick and the well, and especially to the latter, requires that all hospitals provided for the reception of boatmen, sailors, and all indigent poor, during an epidemic yellow fever, should be located beyond the limits of any city or town, and that the free and promiscuous intercourse of the citizens with such hospital should be interdicted.

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XV. That all empty and unoccupied flat-boats at the wharves should be removed early in summer, as they contain a large amount of stagnant atmosphere constantly acted on by the intense rays of the sun, and they may thus become reservoirs of what we have termed *miasm* and *malaria*.

The following *facts* relative to yellow fever in its *epidemic form*, appear to be well established by experience and observation, especially as regards the United States.

1. Foreigners and northern strangers are often attacked with yellow fever in the southern ports of the United States, as well as in the West Indies, when the whole resident or acclimated population is healthy; and the former are the principal victims during any yellow-fever epidemic.\*

2. It is extremely rare that any person is attacked a second time by yellow fever. The first attack produces such a change in the constitution that those who recover are generally forever afterwards exempt from its attack, while they reside in a southern latitude.†

3. In the most virulent epidemics, at least *one half* of those attacked by yellow fever die; when less than that proportion is reported, we may believe many cases have been enumerated as yellow fever which *are not yellow fever*; or that the disease assumes an uncommonly mild form.

4. When an infected district is once formed, the infection spreads slowly and gradually from one or more points, or radiating centres, until it pervades the principal parts of such city or port. In its progress it advances steadily, regardless of promenades, burying-grounds, compact or open squares; over sewers, cist-pools, clean or filthy streets, and in wet or dry weather; it pursues its retreating victims to their farthest retreat, provided they have contracted the seeds of the disease, or breathed the concentrated infection.

5. During an epidemic the virulence of the infection is *more active by day* than at night, and exposure in the infected dis-

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\* See Townsend on the Yellow Fever of New York, pp. 249-252.

† Vide Ibidem, pp. 247-9.

strict is more dangerous at noonday than at night. Night-watches are more exempt, *ceteris paribus*, than the day-watch, from the attacks of the disease.\*

6. Common city filth *has no agency whatever* in generating yellow fever epidemics; on the contrary, it is calculated to absorb or neutralise the infection.† Scavengers and grave-diggers have always been more exempt from attacks of this disease than others.

7. Lime as a *prophylactic*, or a *disinfecting agent*, is *useless if not prejudicial*. Those engaged in spreading lime in cities have been more frequently attacked by the disease than the scavengers. In New York in 1822, the yellow fever spread much more rapidly in Lombardy and Cheapside streets, *after* lime had been spread in them, than previously.

8. Next to blankets, feather-beds, and other similar porous articles, *wood*, such as plank, boxes, ships, wooden houses, &c., retain the greatest amount of *latent infection*. Hence yellow fever prevails most malignantly among crowded wooden buildings,‡ board-fences, temporary sheds, wharf-boats, &c., all of which retain the infection until it is neutralised by cold or frost.

\* See Townsend on Yellow Fever of New York, pp. 252, 253.

† Idem, p. 116.—See Dr. Rush's Inquiries.

‡ The following fact stated by Dr. Bayley, in relation to the tenacity with which fætor from putrescent animal matters adheres to the wood and timbers of ships, will in some degree aid in illustrating the tenacity with which yellow-fever infection adheres to wooden houses, boxes, &c., viz:

"I have often noticed that those vessels loaded with hides and jerked beef which was partly damaged, and where the timbers and ceiling of the vessels became tainted, especially in the hold, the offensive smell has often been removed for the time, by being well ventilated and scrubbed with water:—but afterwards, upon the application of whitewash to the planks, *the offensive smell has been reproduced to a much greater degree than it was at first*. A second white-washing with lime, after the foul smell had again disappeared, again *renewed the putrid effluvia*. This would be produced in a decreasing degree for several times until the vessel was entirely purified." See Townsend on Yellow Fever of New York, pp. 94, 285–321.

This effect was produced by the chemical action of the lime, disengaging the putrid matter absorbed by the wood in a latent state. In the case of the brig *Enterprise* before cited, infection seems to have been absorbed by her timbers in the same way. The same action may be exerted upon the infection of yellow fever.

9. That yellow fever is a peculiar disease; a fever of only one paroxysm, varying from one to three days before the remission and collapse; and that it is radically different in its character from the whole family of remittent and intermittent fevers.

YELLOW FEVER HAS BEEN EPIDEMIC IN THE FOLLOWING TOWNS  
AND PORTS OF THE UNITED STATES

1. CHARLESTON, S. C. This is one of the oldest commercial ports in the United States, and has at all times had an extensive commercial intercourse with the West Indies; and it has likewise been subject to epidemic yellow fever repeatedly during its commercial prosperity.

The *first epidemic* was in the year 1700, again in the years 1703, 1728, 1745, 1748, 1753, 1755. The next was in 1793. From the year 1793 to that of 1807 inclusive, this disease prevailed in Charleston almost every alternate year, either severely or partially.\* From that time until the restoration of commerce, after the peace of 1815, this city, as well as all other ports of the United States, was exempt from this disease. In 1817 the city was severely visited again; and from that time up to the year 1839, a period of 22 years of active and uninterrupted commerce, it has been epidemic in Charleston nine times, or nearly every alternate year. In this city the disease, always appearing among the vessels in port, and in unacclimated persons, is known chiefly by the name of the *stranger's fever*.

2. PHILADELPHIA. This is one of the oldest commercial ports in the Union, but being in a more northern latitude was less liable to epidemic yellow fever than Charleston; yet it was occasionally visited by this disease up to the year 1762. From that time, during all the difficulties and interruptions of foreign commerce, until the close of the war of independence,

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\*See Med. Repos., old series, vol. ii, pp. 234, 235, and vol. iv, p. 100. See Dr. Simonds on Yellow Fever of Charleston.

the city was free from this disease. After the peace of 1783 the foreign commerce gradually revived, and having increased rapidly, Philadelphia became an important port, as the seat of the Federal Government. The consequence was, that yellow fever was introduced every alternate year, until the year 1808, when commerce was again interrupted by new difficulties with England and other European belligerents. This interruption, with the war which followed, gave Philadelphia another exemption for ten years. Since the year 1822, the city, having adopted the policy of New York in prohibiting infected vessels from the port, has enjoyed an exemption from these epidemics, and her commercial interests have been benefited rather than injured.

We may remark, that during the revolutionary war, the autumn of 1778 was *unusually sickly* along the whole Atlantic seaboard, the summer "*being unusually hot and sultry*": but there was no yellow fever, for the want of foreign infection, the general character of the diseases being of the "intermittent" type.\* Yet so soon as commerce with the West Indies was fully revived, the diseases in the seaports dropped the "intermittent" character, and assumed that of epidemic yellow fever. During this time the British army and navy in the West Indies were annually ravaged by this pestilence which prevailed in nearly all the West India ports;† while the inhabitants of the interior were exempt.

3. NEW YORK, lat. 40° 43' north. This city has been gradually increasing in point of population and commerce for the last fifty years, during which it has more than doubled its commerce and population. In a latitude almost too far north for epidemic yellow fever, the city has never been so extensively ravaged by this disease as the more southern ports. Yet it has suffered to a considerable extent, several times previous to the year 1808. After the great expansion of commerce after the late war, yellow fever was occasionally intro-

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\* See Med. Repos., old series, vol. ii, p. 364.

† Coxe's Med. Museum, 1805, vol. i, p. 184.



duced by vessels from the West Indies. But it did not spread epidemically except in 1819 and 1822, the latter being much the most fatal of any previous year.\*

Since the year 1822, a period of nearly twenty years, a judicious quarantine has protected the city from epidemic yellow fever, although the commerce of the city during that time has been more extensive than it ever was previously; while Charleston, Savannah, Mobile, and New Orleans, without any quarantine restrictions, have suffered severely.

4. SAVANNAH. This also is one of the oldest ports of entry. From a very early period it has been occasionally visited by epidemic yellow fever, when it had been prevailing extensively in the West Indies. From the year 1808 to 1817, during the interruption of commerce, it was exempt. Since that time it rarely escapes when Charleston, Mobile and New Orleans are visited. No quarantine regulations have been adopted in this city.

5. ST. AUGUSTINE & PENSACOLA, under the Spanish occupancy, were proverbial for their salubrity, and yellow fever was unknown in them as an epidemic until the Floridas fell under the jurisdiction of the United States on the 17th of June, 1821.† As the treaty of cession had been made several months previously, the emigrants from the United States were pouring into St. Augustine early in the summer of 1821, while the Spaniards were departing as fast as possible for Cuba. Thus a constant intercourse was kept up between Cuba and St. Augustine, by numerous vessels which were transporting the Spaniards and their effects to Havana. These vessels on their return were chiefly freighted with tropical fruits, which were the means, no doubt, of producing an epidemic bilious fever, while some persons contracted yellow fever in the vessels direct from Havana. The following year, 1822, the American emigrants began to crowd into Pensacola; while transports were constantly passing and repassing to Havana, in removing the

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\*See Townsend on Yellow Fever of New York, *passim* A. D. 1822—also N. Y. Med. Repos., vol. ii, pp. 315 and 316.

† William's Florida, p. 207, &c.

persons and effects of the loyal Spaniards. The result was the introduction of a malignant epidemic, which spread rapidly among the unacclimated and promiscuous population who remained in the place. Again, in the autumn of 1825, the population was composed chiefly of recent northern emigrants, who were pouring in daily; and a brisk trade having sprung up with the port of Havana, the yellow fever was again introduced with great mortality. Since that period Mobile and other ports in the Territory of Florida, having withdrawn the trade from Pensacola, have likewise taken away the liability to frequent yellow fever epidemics; and for many years past, Pensacola has rarely suffered from yellow fever, although cases have been occasionally introduced in the national vessels of the United States and other powers.

6. NEW ORLEANS. Site on adhesive alluvial earth, or mud,  $10\frac{1}{2}$  feet above tide level, in lat.  $29^{\circ} 57'$  north. This city has carried on a constant commercial intercourse with Havana and other West India ports, for more than seventy-five years, including the Spanish régime previous to 1803. During this long period, we are not able to ascertain that it has been visited by any malignant epidemic, until it came under the jurisdiction of the United States. Since that time, and especially since the revival of commerce, after the peace of 1815, its population and commerce have increased more rapidly than those of any city in the United States; and the frequency and mortality of yellow fever epidemics have been *pari passu*. In the period of twenty years from 1817 to 1837, the yellow fever has prevailed as an epidemic about nine times; and to such a degree of virulence that in 1819, when the resident summer population was only *thirty-three thousand souls*, the deaths in August were 560 souls, and in September 594. The yellow fever generally, if not invariably, begins its ravages among the shipping and in the population near the wharves.

We infer that any interruption to the commerce of New-Orleans and other Atlantic ports, such as that preceding and during the last war with Great Britain, would again suspend the prevalence of yellow fever in our ports.

For many years after the close of the war of independence, yellow fever was introduced occasionally into some other ports of less note than those we have already named. Thus it was introduced into Baltimore, into Wilmington, Delaware; Port Elizabeth, New Jersey; Norfolk, Virginia; Wilmington, Newbern, and Washington, North Carolina; New London, Connecticut, and Portsmouth, New Hampshire. Yet in most of these places, which were then important ports of entry, the disease manifested itself by only a few cases; and in those only, in most instances, who had had direct communication with infected ships, then lying in port,\* which were charged with "foul air," as it was termed.

7. GIBRALTER and CADIZ, ports of Spain, have been visited by yellow fever. It prevailed in Gibraltar in the summer of the years 1804, 1810, and 1813, and at Cadiz in the autumn of the year 1814. In each of these places it was introduced by vessels from the Spanish Main and the West Indies; and especially by the arrival of large fleets and armaments during the prevalence of the European wars against the power of Napoleon. It has also occasionally appeared in other ports of southern Europe at divers times between the years 1800 and 1815; but there are the strongest reasons to convince us that the disease was introduced by vessels and transports from the West Indies, during the wars which devastated Europe and the West Indies within that period. The troops and marines were those who suffered first and most severely.

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#### ERRATUM.

On page 114, instead of the first sentence of the third paragraph, read the two following:

"5. Opelousas is a large town or city, beautifully spread over an extensive area, upon a dry, rolling prairie, and proverbial for health. The houses are not crowded, and the streets are spacious and cleanly, and destitute of all the causes which are said to generate yellow-fever miasin."

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and Welfare, Public



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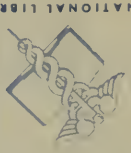


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Health, Education,



Health, Education,



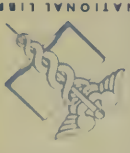
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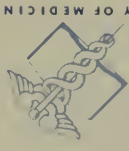
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Health, Education,



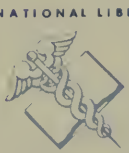
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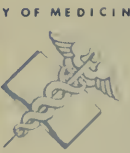
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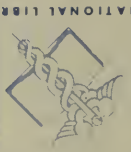


Health, Education,



Health, Education,

and Welfare, Public



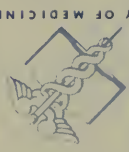
and Welfare, Public



and Welfare, Public



and Welfare, Public



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and Welfare, Public

Health, Education,



Health, Education,



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Health, Education,

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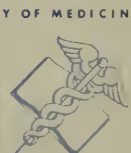


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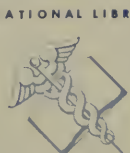


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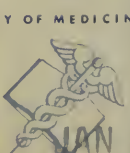
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